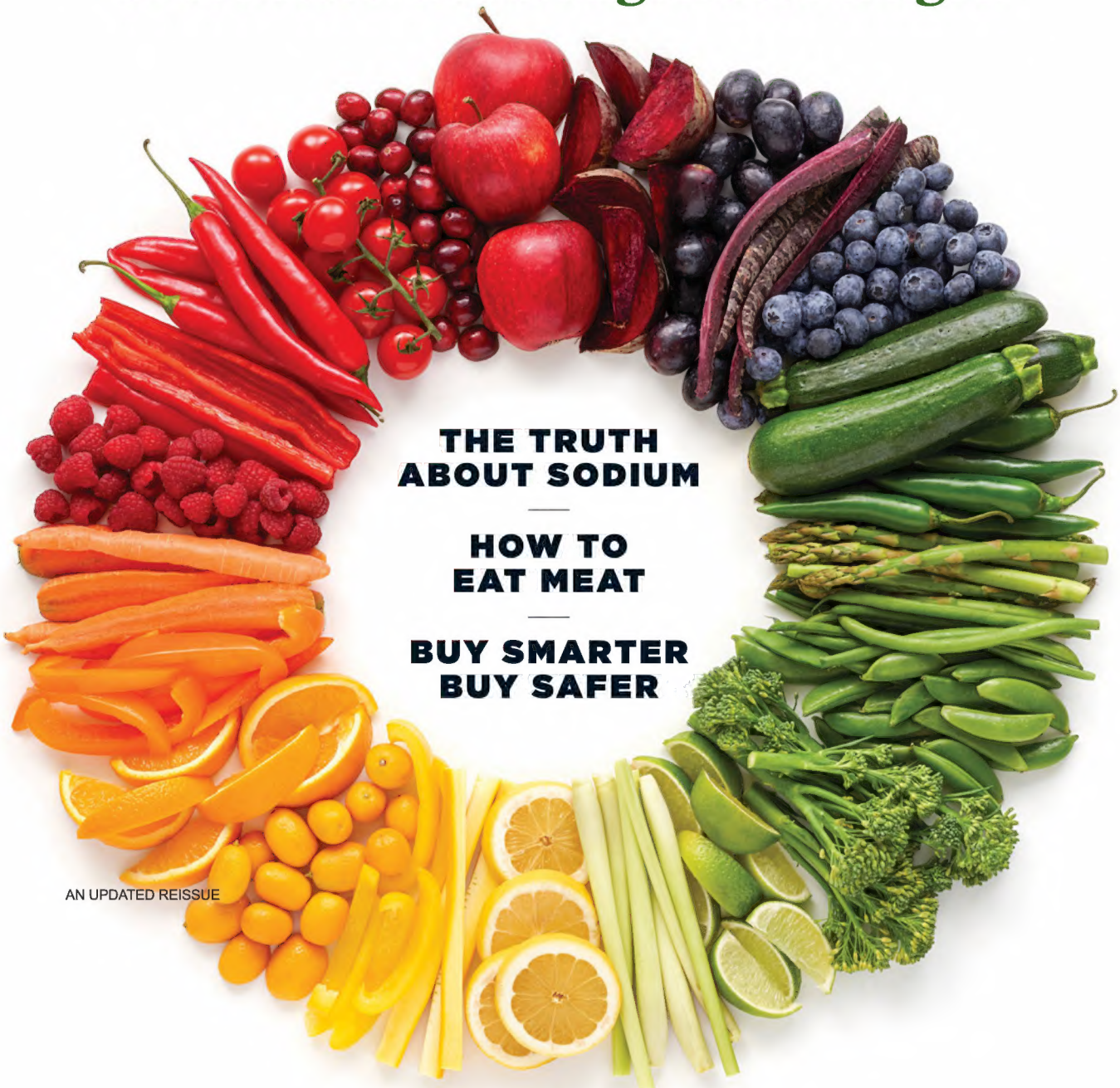
SPECIAL EatingWell EDITION

What to Eat for Life

Feel better. Be stronger. Live longer.



THE TRUTH ABOUT SODIUM

HOW TO EAT MEAT

BUY SMARTER BUY SAFER

AN UPDATED REISSUE

SPECIAL EatingWell EDITION

What to Eat for Life

Feel better. Be stronger. Live longer.

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Parts of this edition appeared previously in EatingWell *and* Real Simple.

INTRODUCTION

Principles to Eat (and Live) By

Finding the best ways to eat for life means navigating through the health-fad and diet clutter.

By Joyce Hendley

IN THEORY, IT'S NEVER BEEN EASIER TO PUT together a healthy way of eating, with more information and scientific understanding available than ever before to guide us. And yet, the answers seem more elusive than ever. Researchers call this the "paradox of choice": with so many options, our confidence in our ability to make the right decision drops. Asking the question "What is the healthiest diet?" in today's world may return scores of plausible, logical responses.

So while the answers may seem to be right at our fingertips, instead we feel confused, buffeted from one supposedly ironclad dietary recommendation to another that seemingly debunks it. Low-fat gives way to low-carb, calorie counting gives way to intuitive eating, low-glycemic to ketogenic.

Yet despite the endless dietary fads and marketing gimmicks, we do know quite a lot about eating patterns that promote good health and long life, and those principles have stood the test of time. "The basic theme of optimal eating—a diet made up mostly of whole, wholesome plant foods—has been clear to nutrition experts for generations," writes David L. Katz, M.D., director of the Yale University Prevention Research Center and an *EatingWell* Advisory Board member, in a recent essay.

We have long known that getting a variety of foods and eating in moderation are two

cornerstones of a sound diet, and that most (if not all) of our foods should be plant-based: vegetables, fruits, legumes, whole grains, nuts and seeds, and healthy fats. Foods such as seafood, poultry, meat, dairy and eggs may or may not be included. We can still get all the nutrients our bodies need without them, though it's somewhat easier to do so when they are a part of our diet. It's also wise to seek out whole or minimally processed foods, and to avoid too many added sugars and excessive salt.

These kinds of eating patterns have long been practiced by people who live in the so-called Blue Zones—regions such as Sardinia, Italy; Okinawa, Japan; and Nikoya, Costa Rica—where life expectancies tend to be longest and attitudes are happiest. Being from such geographically different places, these populations eat very different foods but generally follow similar dietary patterns. Their meals are predominantly plant-based, and they rarely overeat except on special occasions. (Okinawans say before a meal, "*Hara hachi bu*," or "Eat until you are eight parts out of 10 full.")

People living in Blue Zones also tend to have strong social ties with deep roots in family, friends, and faith-based community, are physically active every day, and find time daily to relax—sometimes with a little alcohol. These activities almost certainly help make their healthy diets even more effective.

Another long-known truth: when we focus on eating whole foods, instead of isolating single nutrients, we nourish ourselves. Most foods are a complex mixture of nutrients that can never be perfectly replicated by a supplement, fortified shake or meal-replacement bar. Consider the difference between eating a cup of plain yogurt and swallowing a calcium pill: while both will help you meet about 45 percent of your daily calcium needs, only the yogurt will also nourish you with the fair amount of protein, B vitamins, phosphorus and potassium nature packaged it with—and help satisfy your hunger for hours.

Eating whole or minimally processed foods will help you avoid the fat, salt, and sugar-adding wizardry that goes into so many of the ultraprocessed foods on supermarket shelves, things like extreme nacho tortilla chips and salty-caramel-chocolate protein bars, that can be so alluring and bingeable. Chances are, you'll eat less and still feel satisfied.

Of course, we know that pleasure should be an integral part of eating well. Thinking this way might feel a bit, well, un-American at first, since our traditional dietary advice has avoided the subject of eating pleasure, even if that of other countries hasn't. The latest U.S. Dietary Guidelines direct us to "consume a healthy eating pattern that accounts for all foods and beverages within an appropriate calorie level." In Japan, the dietary guidelines begin with "Enjoy your meals."

Taking time to slow down and savor food you enjoy also helps you absorb it more fully. There's a reason why your mouth waters when you're about to eat something delicious: a "cephalic phase" response is triggered, activating saliva to help break down carbohydrates, as well as the release of pancreatic enzymes and stomach acids to help absorb nutrients along the digestive tract. Appreciating a good meal, it seems, makes that meal even more nutritious.

So the question "What is the healthiest diet?" doesn't really need to be answered. Instead, think of a way of eating that people were choosing long before the food industry stepped in. Plan your meals around colorful vegetables and fruits, earthy whole grains and hearty legumes, satisfying nuts, nut butters and seeds, healthy fats, and optional moderate amounts of seafood, eggs, lean meats, poultry and dairy products. Cook from scratch as much as possible, using spices and seasonings to add rich, satisfying flavors to your meals. Enjoy the pleasures of cooking for yourself and others, and of sharing meals with loved ones. Eat until you're just satisfied, not stuffed.

This approach isn't a healthy "diet"—something you'd go on or off of—but a time-proven way of living well. That's why it will continue to be a wise way to sustain and nourish ourselves, long after the next inevitable diet bandwagon comes around. ●

CHAPTER ONE

Don't Eliminate, Moderate

Simply keeping your intake in check, instead of slashing entire groups of "bad foods" from your diet, is a better path for staying on track and fighting off chronic issues.

YOU DON'T NEED TO FIGHT THE FAT

Bacon is everywhere. Butter is the new darling. Seems that fat is back big time. But should it be?

By Shaun Dreisbach

AS A NATION OF EATERS, WE'VE BEEN OBSESSED with fat for more than half a century. And in 2014, the fervor hit a new level. Headlines based on influential studies screamed "Butter Is Back," "Bacon Is Good for You" and "Ending the War on Fat"—stories suggesting everything we'd known was wrong and that we, in our collective wisdom, had done a nutritional one-eighty on fat. Further case studies and research as recent as 2018 built on the seminal 2014 reports. Understandably, a lot of questions followed. Does this mean Julia Child—the original queen of butter and foie gras—had it deliciously right all along? Are we moving away from the idea of good and bad fats? Should we embrace marbled beef? Most of all, what does a heart-healthy diet look like now?

That feeling of being nutritionally adrift is understandable. For anyone health conscious, an aversion to (if not flat-out fear of) so-called artery-clogging fatty foods has become as ingrained as the advice to get eight hours of sleep a night and exercise regularly. It all started back in the 1950s, when physiologist Ancel Keys made headlines by discovering that saturated fat raised cholesterol levels. Since cholesterol was known to increase the risk for heart disease, the logic went, we should avoid foods with saturated fat. Shortly thereafter, dietary guidelines were born and the idea of eating low-fat took off.

Then, about 20 years ago, the concept of "good" and "bad" fats was introduced. We were told to be eagle-eyed about saturated fat—trans fat joined the no-no list a few years later—and to embrace unsaturated fats like oils, nuts and avocados. So when a recent study in the *Annals of Internal Medicine* concluded that saturated fat does not, in fact, appear to increase risk of heart disease (the idea that

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INSTEAD OF COOKING BACON THE OLD-FASHIONED WAY IN A SKILLET, USE THE OVEN. YOU CAN FEED MORE BACON LOVERS AT ONCE AND ELIMINATE SOME MESS.

sparked those headlines), decades of understanding threatened to be upended. The researchers analyzed data from 76 studies involving more than 600,000 people and found that those who ate the most of this so-called "bad" fat did not have a higher risk of cardiovascular disease than those who ate the least. (Trans fats remain a villain: in the study, they were associated with a higher risk.)

So should we end the war on fat? You'll find answers on the next few pages. But first, let's dispel one key myth about the *Annals* study: despite the news headlines, no one (at least in nutrition circles) is saying that all saturated fat is healthy. "Lack of harm is not the same thing as being beneficial," explains David Katz, M.D., M.P.H., director of the Yale University Prevention Research Center and an *EatingWell* advisor. "We found saturated fat is on average neutral compared to everything else we eat—it doesn't seem to affect heart disease risk," adds Dariush Mozaffarian, M.D., Dr.PH., dean of the Friedman School of Nutrition Science and Policy at Tufts University and a coauthor on the study.

Now to the question on every omnivore's mind: How could this be? Was all the earlier research that has informed our eating habits wrong? Not entirely. "Our initial science was just focused on 'bad' LDL cholesterol—and showed that saturated fat raises LDL levels, which in turn raises heart disease risk. That's all the evidence we had," says Mozaffarian. "But nutrition science—which isn't even 100 years old—has advanced rapidly, and the data has changed." It's true that sat fat raises LDL cholesterol; that finding from the 1950s holds up. But what researchers have since discovered is that it also raises HDL, the "good" cholesterol. And saturated fat does not increase *the number* of LDL particles, one of the most important predictors of cardiovascular risk. Saturated fat simply makes LDL particles larger, and that's pretty benign in terms of cardiovascular disease.

It's worth noting, too, that this isn't some newfangled theory. Evidence that saturated fat may not raise heart disease risk has been in the literature for decades, and the issue is still being studied—and debated. Not everyone agrees on the degree to which saturated fat impacts our health. But for now the bottom line appears to be this: "We've evolved our thinking and the 'good' and 'bad' stuff has got to go," says Pamela Peeke, M.D., adjunct assistant professor at the University of Maryland School of Medicine. "Let's think in terms of beneficial and not-so-great. There is no bad, except for trans fats."

There is even preliminary evidence that suggests some types of saturated fat may be more neutral than others—and possibly even beneficial. Stearic acid, a kind of saturated fat in dark chocolate and beef, for example, has been shown to have no heart-harmful effects, notes Katz. And, in the context of an overall healthy diet, it may possibly offer some pros: a 2014 study in the *Journal of Human Hypertension* found that a DASH-style diet (low in salt and sugar, rich in fruits, veggies and whole grains) that swapped in lean beef as the main protein source (about four ounces a day) lowered blood pressure and improved blood vessel function. An earlier study concluded that a similar diet can also improve cholesterol levels. Then there's coconut oil. It was once demonized for its superhigh sat-fat content (92 percent!). But the kind of fat it's primarily composed of (lauric acid) now appears to have no impact on cholesterol. Still, this is complex—because, as Mozaffarian points out, foods like beef, dairy, nuts, tropical oils and vegetable oils contain multiple types of saturated and unsaturated fats, and how the body reacts to them (not to mention the other nutrients in the food) can impact their health effects. At the moment, there's no need to get in a twist about specific saturated fats until scientists sort out more of the details.

For now, the bottom line appears to be this: "We've evolved our thinking and the 'good' and 'bad' stuff has got to go."

The *Annals* study also sparked a serious conversation about another health issue at play: what replaced the fat in our diets when we banished it. Basically we started eating more sugar and processed carbohydrates. "We replaced one thing with something worse," says Mozaffarian. "These types of refined carbs do lower LDL levels, but they also lower HDL levels and increase triglycerides [a type of fat in your blood]. They're also linked to higher blood glucose and weight gain. So we're not just

talking about an increased risk of heart disease, but also obesity and diabetes." That may be part of the reason why the group in the *Annals* study who ate the least saturated fat didn't have lower rates of cardiovascular disease than those who ate loads of it—because they were subbing in unhealthy processed carbs and sugar instead. It also helps explain why, despite the fact that we've lowered our saturated fat intake over the past several decades, obesity rates have continued to climb and heart disease is still our number-one killer. "What the study really tells us is that there's more than one way to eat badly," says Katz.

So what exactly should we be eating, given all this new evidence? A diet that's almost forehead-smackingly simple—and which most experts agree on, no matter where they fall on the saturated-fat issue: eat a diet rich in a variety of fruits, nuts and vegetables, some healthy protein like fish, poultry and dairy, and minimally processed, whole-grain carbs. How should we think about fats? For the record, the Dietary Guidelines for Americans recommend limiting saturated fat to less than 10 percent of total daily calories—and instead emphasizing foods containing unsaturated fat. Eating way more of these genuinely healthy fats than saturated ones is advice worth following. Still many experts have a different take: "We shouldn't be thinking about fat at all," says Mozaffarian. "It's about the overall quality of the foods you eat. Depending on the foods you choose, you can eat a low-fat diet that's terribly unhealthy and raises your heart disease risk, and you can eat a high-fat diet that does the same, or you can eat very healthy versions of either."

He and other experts believe we get too hung up on grams and percentages, and what we really need to do is take a big-picture view of what we're eating. "Foods are complicated," explains Mozaffarian. "We can't just look at one aspect and judge their overall healthfulness." Katz agrees: "It's time to stop focusing on macronutrients like fat and think in terms of what should make up the majority of your diet. If you do that, you can't go too far wrong." So . . . if you want to have the *occasional* cheeseburger, it's fine.

Looks like Julia Child was on to something after all. Her wise words: "I think one of the terrible things today is that people have this deathly fear of food: fear of eggs, say, or fear of butter. Most doctors feel that you can have a little bit of everything." ●

The Oil Guide

Fat isn't just a nutrient essential to your body, it's also a key player in cooking. Here's what you need to know about the healthiest cooking oils.

EXTRA-VIRGIN OLIVE

Eating EVOO in place of saturated fats can lower the risk of heart disease, high blood pressure and stroke—and lower cholesterol.

AVOCADO

Though chlorophyll, which causes the green hue, has been touted as a blood cleanser, there's no solid science backing these claims.

CORN

Composed of mainly polyunsaturated fatty acids, corn oil is low in saturated fat, packed with vitamin E and has been shown to lower blood pressure.

CANOLA

With the smallest amount of saturated fat, canola oil has the most omega-3 fats of any of the common cooking oils. It's also loaded with vitamins E & K.

PEANUT

It's the only oil that contains small amounts of resveratrol, a compound that may protect against certain cancers and heart disease. Also a source of vitamin E.

GRAPE-SEED

Pressed from the seeds of wine grapes, this oil is rich in polyunsaturated omega-6 fats, which help lower cholesterol, and it also delivers vitamin E.

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HEAT AND LIGHT CAN DAMAGE OIL AND MAY ALTER ITS TASTE, SO STORE OIL IN A COOL, DARK PLACE FOR UP TO A YEAR.

THE TRUTH ABOUT SODIUM

Salt finds its way into almost everything we eat. Here's what you need to know about those craveable crystals.

By Karen Ansel, M.S., R.D.

WE CRAVE IT. WE LOVE IT. IT'S NOT SURPRISING why: salt makes food taste delectable. It helps keep food fresh and safe from spoilage. We also need salt. We literally can't survive without sodium. Salt (a.k.a. sodium chloride) is our chief supply of this mineral, which helps our muscles contract, sends nerve impulses throughout our bodies and regulates fluid balance so we don't become dehydrated.

But for more than four decades, health authorities have urged us to consume less salt. That's because salt is roughly 40 percent sodium, and too much of it can elevate blood pressure. In your body, sodium acts like a magnet for water, pulling fluid into your bloodstream. That excess liquid increases the pressure in your blood vessels and over time can damage their linings, potentially causing blood clots to form. Once those blood clots develop, they can eventually cause blockages that can lead to a heart attack or stroke.

Most people eat about 3,400 milligrams of sodium a day. Downsizing our sodium intake to 1,500 milligrams daily would have major health benefits, slashing 16 million of the nation's 68 million cases of hypertension and saving $26 billion in health care costs, according to the Centers for Disease Control. In 2004, the Institute of Medicine (IOM) agreed, advising anyone over age 50, of African American descent or with high blood pressure, chronic kidney disease or diabetes to limit their sodium to 1,500 milligrams. That's nearly half of all Americans. The rest of us were advised to keep our numbers below 2,300 milligrams, the amount in roughly a teaspoon of salt.

Then in May of 2013, in an apparent about-face, the IOM released a report concluding that too little sodium may be equally problematic for some people, particularly those with congestive heart failure. Even more startling, it announced there was no solid evidence that people with diabetes, kidney disease or cardiovascular disease would benefit from the previous 1,500-milligram cap and instead stated that 2,300 milligrams would be more appropriate.

However, if you read the report's fine print you'll find that the IOM admits that the data used to make the updated 2013 recommendations contains gaps in its methodology. What's more, shortly after the 2013 announcement, one of the main studies that the IOM report relied on was retracted by the journal *Heart*, leaving us more confused than ever.

Yet perhaps we're missing the point. "By debating whether 1,500 or 2,300 is the magic number, we're dancing on the head of a pin," says Jane Henney, M.D., chair of a 2010 IOM Committee on Strategies to Reduce Sodium Intake in the United States. "We're all eating so much more sodium than any of those numbers that if we can reduce our intake to between 1,500 and 2,300 milligrams a day we'd be a lot better off."

Even if most Americans were interested in eating less sodium, whittling our intake down seems like a nearly impossible task. That's because sodium saturates our food supply, occurring naturally in many foods but also lurking in foods that don't even taste salty, like breakfast cereals or jarred pasta sauce. Adding more naturally low sodium foods to your diet, like potatoes and nuts, keeps the salt intake in check. ●

Seasoning with Salt

There are more types of salt to choose from than ever. Here's how to sort out the options:

TABLE SALT

Composed of small, compact crystals, table salt is made with (harmless) anticaking additives that make it free-flowing. It contains 2,360 milligrams of sodium per teaspoon. Iodized salt is table salt with iodine added, because many Americans don't naturally get enough iodine in their diets.

KOSHER SALT

This coarse-grained salt is free of additives. Many people prefer cooking with its larger crystals. Those crystals also deliver at least 20 percent less sodium per teaspoon than iodized or table salt. We call for kosher salt in *EatingWell* recipes.

SEA SALT

As its name implies, sea salt is made from evaporating water from the ocean or saltwater lakes. As each body of water is unique, differing types of salts have varying compositions of minerals. So the flavor, texture, color, crystal size and sodium vary. Despite some marketing claims, sea salt doesn't always mean less sodium. Sodium quantity depends on crystal size: larger crystals mean less sodium per teaspoon.

FINISHING SALTS

Black salt, Himalayan pink salt, Fleur de Sel and other so-called finishing salts are designed to be used at the end of cooking. They're helpful for bringing out the naturally sweet flavor of veggies. These gourmet salts are perfect for providing pure salty taste plus a pop of crunch, but they're powerful and so a little goes a really long way.

SOLVING THE SUGAR PUZZLE

There's a lot of confusion out there about sugar—what's good? What's bad? Here's what the science says.

By Rachael Moeller Gorman

ON A STEEP, WET HILLSIDE NEAR THE EQUATOR, two hands place sugarcane stalks in shallow dirt trenches and cover them carefully with damp soil. Sprouts soon poke from the tropical ground in long, straight rows. After 12 to 18 months, the bumpy stalks grow as thick as a fireman's pole and as tall as a two-story house. Workers harvest the giant cane by hand and take it to the nearby sugar mill, where heavy metal rollers crush the stalks into a pulp and extract the sweet juice. Heat condenses the liquid into a syrup, and the molasses is spun out.

Hard labor, primitive processing and months of waiting, all for one precious product: a small pile of sweet crystals, the last 17 percent of the original sugarcane plant, a substance commonly known as raw sugar, or sucrose.

The dance happens all over the earth. Sugarcane takes up 16 percent of the world's total cultivated agricultural land—making it the world's biggest crop: 2.6 times more sugarcane is produced each year than wheat, 6.4 times more than soybeans. With this yield, in addition to the sugar we extract from other plants, such as sugar beets (55 percent of U.S. sugar comes from sugar beets), maple trees, corn and even coconuts, the amount of sugar produced has grown. Worldwide consumption of added sugar (sugar not naturally found in food) has tripled over the last 50 years. Americans now spend about 23 percent of grocery dollars on processed foods and sweets—nearly double what we spent 20 years ago. Though the American Heart Association recommends women limit their added sugar to just 100 calories per day (six teaspoons) and men to 150 calories a day (nine teaspoons), the average American, consciously or not, now eats 28 teaspoons of added sugars a day, or more than 90 pounds per year.

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DETERMINE HOW MUCH ADDED SUGAR YOUR PRODUCT CONTAINS BY COMPARING IT TO A COMPARABLE SUGAR-FREE PRODUCT—FOR EXAMPLE, STRAWBERRY YOGURT AND PLAIN YOGURT.

It doesn't take a medical genius to surmise that putting so much sugar in our bodies might not be a direct path to health nirvana. Most experts agree that we all eat far too much of it: rates of obesity have dramatically increased in the United States over the past 20 years, and studies have linked drinking large amounts of sugar-sweetened beverages to increased risk of obesity, especially in children.

One researcher in particular says there's a lot more to the health story than simply nutrient-empty calories from added sugar making us fat. The researcher, Robert Lustig, M.D., a pediatric endocrinologist at the University of California, San Francisco, states it like this, bluntly: "Fructose is a poison."

"High fructose" corn syrup (HFCS) and table sugar (sucrose) are both composed of two smaller sugar molecules, glucose and fructose, in roughly equal proportions. (HFCS and sucrose are virtually chemically equivalent, say most scientists and doctors.) The glucose part is fine, says Lustig; it's the body's preferred fuel, the type that smoothly runs the billions of cells in our bodies. But the fructose part "is a chronic poison," he says. "It doesn't kill you after one fructose meal, it kills you after 10,000. The problem is, every meal now is a fructose meal." HFCS is being added surreptitiously to processed foods. It has found its way into everything—from pretzels to ketchup.

Lustig says this megashot of fructose from added sugar uniquely gums up our inner workings and causes—in fact, is the primary cause of—metabolic syndrome, the constellation of disorders, including type 2 diabetes, cardiovascular disease and fatty liver disease, that are devastating our country. All of this happens, Lustig says, when we're consuming too many calories—and most Americans are eating 200 to 300 extra calories a day. He is quick to point out that he only means the fructose found in added sugar, the superhigh levels of sucrose and HFCS we eat in processed foods and drinks (including fruit juices), not the lower levels found in fiber-rich whole fruit nor the sugars (lactose) found naturally in milk.

Lustig first laid out his hypothesis to the general public in a 2009 lecture at UC San Francisco called "Sugar: The Bitter Truth." The university filmed the charismatic lecturer. The video was posted on YouTube; it went viral. In 2011, the *New York Times Magazine* published a piece by Gary Taubes in which he admired Lustig's theory, and the *Times* interviewed him in 2014. *60 Minutes* has also featured Lustig, in a segment on toxic sugar.

Lustig presents a tempting, epic story of good versus evil, concluding in both his video and a recent commentary in the journal *Nature* that the government should regulate added sugar as it regulates alcohol. "Fructose is ethanol without the buzz," he says. And we are riveted: as of November 2018, over 7.8 million people had sat down in front of their computers and watched Lustig's 90-minute lecture on fructose biochemistry, which he begins with a sort of arm-around-the-shoulder, conspiratorial tone: "I'm gonna tell you, tonight, a story." We crave a good narrative with real answers almost as much as we love sugar. But does the science actually support Lustig's theory?

The Science of Sugar

Tens of thousands of years ago, before two-liter sodas and oversized candy bars, our tongues rarely tasted sweetness. Sugar was extremely hard to come by. Honey had it (but it was protected by bees), and fruit contained it, enveloped in a fiber cage, but otherwise sweetness was a sensation few people experienced, and when they did it was only in certain months of the year.

But because sugar provides safe calories (almost no plant that tastes sweet is poisonous), we evolved to crave it. Our brains are hardwired to release a big shot of joy whenever we taste sweetness, by unleashing a chemical called dopamine that sparks our brain's pleasure center, a region called the nucleus accumbens. We also have a second way to make sure we are constantly on the lookout for this valuable energy: even the thought of sugar makes us happy. The brain releases dopamine before we eat sugar, while we're seeking it out and as we anticipate putting it in our mouths. We have an ancient, always-on, deep-brain need to fill our stomachs with sweet calories.

Now, rubbing the magic lamp, we've finally gotten our genes' greatest wish: an endless supply of sugar. In the United States, sucrose can be found all over the supermarket, but, more insidiously, HFCS is ubiquitous as a cheap source of sweetness, a result

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NATURAL SUGARS, WHICH ARE BROWN BECAUSE OF RESIDUAL MOLASSES, ARE LESS OF A PROBLEM SINCE THEY ARE PACKED WITH OTHER NUTRIENTS.

of subsidies to corn farmers. "High-fructose corn syrup is evil, but it's not evil because it's metabolically evil; it's evil because it's economically evil," Lustig says in his YouTube video. Because it's so cheap, it has found its way into nearly every processed food, including crackers, yogurt and tomato sauce, as well as cookies and sweetened beverages such as sports drinks, juices and sodas.

But, Lustig says, the genie played a trick on us. Lustig explains the problem with fructose by explaining what happens when you put one of these processed goodies—say, a cracker—into your mouth. (The details of this theory were mostly formulated through studies in animals.) First, a bite. Then another bite. Sprinkles of cracker descend into your stomach and then to your small intestine, where enzymes dissect sucrose molecules into their constituent parts: glucose and fructose. (HFCS molecules are not bonded, thus the glucose and fructose are already free.) Remember, glucose is the fuel of choice for our bodies; our cells use it or store it easily even when we eat it in high doses in processed food. Fructose, on the other hand, cannot by its very nature slip into our body's cells to make energy, so almost all of it slides down the portal vein into the liver, the toxin-processing organ, where it's dumped—and dumped again, as we eat more sweetened food.

What does our liver do with all this second-rate fructose fuel? It can't store it, so it tries to break it down into energy. But the cells' normal energy-generating cycle cannot possibly spin fast enough to process this mountain of fructose, so most of it meanders off into the liver in the form of citrate.

Too much citrate can hurt us. Citrate is the raw material for fat molecules called triglycerides. Excess

triglycerides in the blood trigger cardiovascular disease, says Lustig. Some of the citrate also stays as fat droplets in the liver; a fatty liver triggers insulin resistance, which causes type 2 diabetes.

But it's not just the citrate. Lustig says that eating too much fructose can also spark inflammation in the liver, as well as increase blood-pressure-raising by-products like uric acid.

Overall, eating too much fructose from added sugar is like using unleaded gasoline in a diesel engine: it makes bodies sputter and cough till they seize in a puff of smoke.

Not all agree with Lustig's toxic-sugar theory. "That talk, what made it so viral was the extreme position," says David Katz, M.D., M.P.H., director of the Yale University Prevention Research Center and an *EatingWell* advisor. "Vilifying a certain nutrient is a good-versus-evil worldview. It's easy to get people excited if you say the most extreme thing."

Yet Lustig is not the only one to theorize that fructose is causing some of our modern health problems. Years before Lustig splashed into the scene, George Bray, M.D., at the Pennington Biomedical Research Center, in Louisiana, and Barry Popkin, Ph.D., at the University of North Carolina at Chapel Hill, noticed that rising rates of obesity paralleled an increase in sugar consumption, and they loosely attributed this to the harmful way our bodies metabolize fructose. Other studies since have more strongly linked consuming sugar-sweetened beverages like sodas and juices with obesity, at least in children and adolescents, and for years researchers have been giving animals extremely high doses of fructose to create metabolic syndrome.

Are We Overdosing?

Kimber Stanhope, Ph.D., and Peter Havel, D.V.M, Ph.D., have conducted trials in their labs at the University of California, Davis. In one of their studies, overweight or obese people who spent 10 weeks drinking 25 percent of their calories from fructose drinks (versus a group drinking glucose) increased their postmeal triglycerides (a risk factor for heart disease) and decreased insulin sensitivity (a risk factor for type 2 diabetes).

Interestingly, the researchers also found that drinking fructose caused subjects to gain visceral fat, the kind of fat in the belly that's associated with metabolic syndrome; drinking glucose added fat, too, but here the fat was subcutaneous, the "safe" kind that has no established relationship with disease. Drinking fructose also enhanced the body's ability to convert carbohydrates into fat in the liver, which causes insulin resistance and type 2 diabetes.

Still, the fructose doses used in studies like Stanhope's are higher than most humans would normally consume. There's "no unequivocal evidence

that fructose intake at moderate doses is directly related with adverse metabolic effects," said Luc Tappy, M.D., professor of physiology at the University of Lausanne and one of the world's premier fructose researchers, in a review. But Lustig thinks the higher doses in many of these trials just speeds up the inevitable. "It's completely dosage dependent. A little is fine. A lot is not. And that's true of every poison," says Lustig.

Many scientists think that focusing public health on one vilified nutrient is the wrong tack to take. Such a strategy has backfired before: for example, doctors once told us all fat is bad, so manufacturers took it out of processed foods (and, interestingly, replaced it with sugar). Today, it's recommended we eat 20 percent to 35 percent of calories from fat—most of which should be the healthy, unsaturated kind.

"We certainly agree we should eat less sugar, but I think he's making a huge mistake from a public health perspective," says Katz of Lustig. "We spent the last three decades doing exactly this: we thought just oat bran is good for us, so we put it in everything. Then we just needed to cut fat. Then it was carbs. So I can imagine we'll soon have a vast proliferation of sugar- or fructose-reduced junk food filled with some unhealthy substitute . . . I can't help but roll my eyes and ask, how many times do we have to get this wrong before we get it?"

At the end of Lustig's YouTube lecture that sparked the sugar firestorm, the camera switches from generic blue PowerPoint slides to a gray-haired, gray-suited Robert Lustig. After 90 minutes of science, Lustig gives the audience some advice: drink only water or milk; exercise; eat your carbs with fiber (fruit's fiber slows the absorption of fructose so it never overwhelms your liver: "When God made the poison he packaged it with the antidote," says Lustig); wait 20 minutes before your second portion. It's all we need to avoid a deadly fructose fate, he says.

At the very end of his lecture, Lustig peers at his captive audience. He pauses a moment, and makes his final appeal. "I'm standing here today to recruit you in the war against bad food," he says. "And this [added sugar] is what's bad." The storyteller closes his book. It's up to us to write the final chapter. ●

Sweet Choices

Confused in the sugar aisle? Use this handy comparison chart to help you decide which sweetener to choose and how to use it.

GRANULATED SUGAR

Composed of 50 percent glucose and 50 percent fructose, this pure white sugar has been processed and so has few minerals and antioxidants. It's best used for making sugar cookies, meringue toppings and delicate, fluffy cakes.

HONEY

Delivers slightly more fructose than glucose. Honey's antioxidant quantity varies greatly based on type; buckwheat honey typically delivers the most. Use it to provide a delicate, sweet flavor to dressings, marinades and slaws.

MOLASSES

Roughly equal parts glucose and fructose, dark molasses has the highest antioxidant levels of all sweeteners (per serving, similar to levels in nuts and berries). It adds distinct flavor and a hint of sweetness to baked beans, homemade barbecue sauces, brown bread and ginger cookies.

BROWN SUGAR

Also half glucose, half fructose. Made by adding molasses back into white sugar, brown sugar has more calcium and iron than white (but only trace amounts). It brings caramel flavor to cookies, brownies and darker cakes like carrot cake and quick bread.

DATE SUGAR

Made from ground dates, it delivers all the nutrients in dates, including potassium and calcium—and is similar in antioxidants to molasses. Try baking it in banana bread and bar cookies.

RETHINKING DRINKING

New research shows that too many women are drinking too much—and it's often habit (wine o'clock), not addiction, that's to blame. Here's a look at our current (complicated) relationship with alcohol, and how to make it a healthy one.

By Camille Noe Pagán

I DRINK TO UNWIND. DINNER ISN'T MADE YET, BUT the sink is already full of dishes. There are bills to pay, and as my buzzing phone has just reminded me, I have e-mails to answer and more work to tackle after the kids go to bed. I grab the open bottle of wine in the fridge, pour myself a glass—and suddenly feel like I've just hit the pause button on an otherwise never-ending day.

Sound familiar? "Drinking makes many women feel like we can do the heavy lifting in an ever-evolving, complex world," says Ann Dowsett Johnston, the Toronto-based author of *Drink: The Intimate Relationship Between Women and Alcohol*. "There's this feeling of 'I'm doing it all—why shouldn't I have something for myself?'"

Two thirds of American women consume alcohol regularly (having at least one drink within the past week), with most citing wine as their beverage

of choice, according to a 2013 Gallup poll. That number has stayed fairly constant over the past two decades, but something more significant has changed: an increasing number of us are overimbibing. Almost 25 percent of women drink heavily at times (four or more drinks on any day or more than eight drinks in a week), according to a 2014 study from the Centers for Disease Control and Prevention (CDC). And heavy or "binge" drinking (consuming four drinks or more per occasion) rose 18.9 percent among women between 2005 and 2012. Men saw an increase of 7.3 percent during that same period.

Moderate drinking is defined as one drink a day for a woman (two for a man), but you can have a second—or even a third—provided you scale back during the rest of the week, according to the National Institute on Alcohol Abuse and Alcoholism. The organization divides drinking into two categories:

Anything beyond eight drinks a week can increase the risk of heart disease, depression, sleep disorders and other issues.

- **LOW-RISK DRINKING** is no more than three drinks in a single day and no more than seven drinks in a week for a woman. For a man that limit is four drinks in a day, and 14 drinks in a week.
- **AT-RISK OR HEAVY DRINKING** is drinking more than either the single-day limit or the weekly limit.

This Is Your Body on Booze

Alcohol has long enjoyed a health halo, thanks to the much touted Mediterranean diet and Champagne-enthusing books such as *French Women Don't Get Fat*. Many studies have linked roughly a drink a day to a reduced risk of heart disease, a lower body mass index, and even a longer life. The result: a widely held belief that alcohol is teeming with health benefits. "I've had patients proudly tell me that they have at least a glass of red wine daily," says Nieca Goldberg, M.D., medical director of the Joan H. Tisch Center for Women's Health at NYU Langone Medical Center, in Manhattan. "The antioxidants in alcohol appear to increase levels of good HDL cholesterol, but drinking isn't the best way to improve cholesterol—exercising is." Not to mention the fact that too much alcohol raises blood pressure and weakens the heart muscle.

And studies show only a correlation between alcohol and wellness—not that alcohol itself is beneficial, says William C. Kerr, Ph.D., a senior scientist and the center associate director at the Alcohol Research Group at the Public Health Institute, in California. "It may be that people who drink moderately also eat moderately or have higher incomes and therefore better access to health care," says Kerr. "If you don't drink, you certainly shouldn't start with the assumption that you're going to improve your health."

And anything beyond moderation inverts the health equation. After just a few drinks a week (more than one drink per day for women or two for men), your odds of developing breast and other cancers begins to rise. Anything beyond eight drinks a week can increase the risk of heart disease, depression, sleep disorders and other issues.

Women are uniquely vulnerable to the effects of heavy drinking. Alcohol is water-soluble, and women's bodies are made up of 52 percent water, compared with men's 61 percent, says John Whyte, M.D., an internist at the Kaiser Permanente medical center in Washington, D.C. As a result, "a man's body automatically dilutes alcohol more than [a woman's] will, even if you have the same body weight," says Whyte.

Also, women are usually smaller-framed and have lower levels of alcohol dehydrogenase, an enzyme that breaks down alcohol in the stomach. The result: "Women get drunker easier and faster than men," says Howard Monsour Jr., M.D., the chief of hepatology at Houston Methodist Hospital, in Texas.

Alcohol lingers longer in a woman's body, where it has more opportunity to cause cellular damage. It also raises estrogen levels, "which may be part of the reason even moderate drinking elevates breast cancer risk," says Goldberg. Then there's your liver, which eliminates poisons from your body. Whether you're drinking beer or bourbon, the liver ultimately treats alcohol like a poison. That's why it bears the brunt of drinking's damage.

And binge drinking has its own potential

side effects. Says Gyongyi Szabo, M.D., Ph.D., the vice chairman of the department of medicine at the University of Massachusetts Medical School: "Binge drinking can upset the balance of gut bacteria and make the intestinal wall leaky, so to speak, which can cause GI problems and increase inflammation in the liver and elsewhere." It might not be fair, but once again this happens to a greater extent to women than to men.

Developing a Healthy Habit

If you tend to have a glass (or three) of wine every evening, the good news is that it might likely be a habit rather than an addiction. Only one in 10 people who drink excessively fits the criteria for alcohol dependence (often referred to as alcoholism, though many experts no longer use this term), says the 2014 CDC study. "Humans like to repeat things that feel good," explains Michael Levy, Ph.D., a psychologist in Salem, Massachusetts, and the author of the 2007 book *Take Control of Your Drinking . . . and You May Not Have to Quit.* "Drinking too much is often a subtle phenomenon. You get used to it one drink at a time—until suddenly it's your way in the world."

Is it better to drink moderately or not at all? Experts disagree. Although many studies show that moderate drinkers might live longer and have better overall health, Kerr recommends talking to your doctor about drinking if you have tested positive for the BRCA1 or BRCA2 breast cancer genes or have a family history of liver disease or breast cancer. You should also avoid alcohol if you've suffered from alcohol dependence or an addiction to prescription drugs or illegal drugs in the past.

Check the label before you pour. The percentage of alcohol in wines and beers can vary. One bottle of red wine may contain 12 percent alcohol, while another may contain 15 percent or more.

If you suspect you might drink too much, and you want to curb your intake, decide how much you'll drink before you start. "'I'm going to cut back' is too vague," says Levy. "But 'I will have two glasses on each weekend night, but not during the week' gives you a map of how to behave." He advises taking at least three days a week off, both to give your body a break and to get your mind used to not expecting a drink every night. Let your friends and family know that you're setting limits for yourself so that they don't talk you into having "just one more."

So, if you choose to drink, don't do so for your health, but rather for the pleasure of it, the way you'd enjoy an occasional dessert or cheeseburger. ●

CHAPTER TWO

Keep It Real

Convenience foods have their upside, but navigating all those aisles of bottles, boxes and bags can be tricky. Here's how to spot the overly processed options (keep walking) and go for the good stuff.

Nutrition
at 3g
ated Fat 0g
erol 0mg
300mg
bohydrate 13g
Fiber 3g

THE IMPACT OF FOOD LABELS

The words and information on packages have a big influence on what we eat. But do we understand what we're reading?

By Rachael Moeller Gorman

I'VE LOVED FOOD LABELS ALMOST AS LONG AS I'VE loved food. As a child, I would scrutinize the packages of everything I ate, while I ate, to the dismay of everyone else at the table. I would quiz my younger brother on the amounts and percentages of nutrients in the foods ("Chris! How many milligrams of sodium are in this tablespoon of ketchup? CHRIS?!") and make him guess till he got it right. I scoured breakfast cereal boxes when shopping with my mom to find the healthiest option. I think, perhaps, I was a strange kid.

These days when I'm at the grocery store, I feel like I'm walking a gauntlet of flashing Las Vegas neon signs: High in protein! With omega-3 fatty acids! Contains probiotics! High in calcium! Whole wheat! High fiber! Gluten-free! All-natural! Organic!

On a recent trip down the cereal aisle with my own kids, a certain box of flakes with "smart" in the name catches my eye. The front of the package extols the cereal's antioxidants. A green banner at the top exclaims "fiber" and "whole grain" in capital letters, decorated with a flourish of light-green leaves. A stamp at the bottom informs me the cereal is good for my heart, and a panel of tabs at the top tells me it contains a couple of great vitamins. At least six different healthy claims catch my eye. It looks extremely wholesome.

It's not until I turn to the Nutrition Facts panel, where the "real" nutrition information hides, that I see the kicker: there's more sugar in the cereal (14 grams, or about three and a half teaspoons per one-cup serving) than there are whole-grain oats. (One of the six small tabs on the front of the package does mention sugar but is overshadowed by everything else up there.) This "lightly sweetened" confection contains more sugar (and also

more calories) per cup than Froot Loops.

It seems this cacophony of health claims is food manufacturers' way of elbowing ahead of competitors. (Formulations and packaging are always changing; check what's on the shelf for the most up-to-date information.) Hartman Group research from 2016 found that the majority of consumers pay attention to food labels. Eighty-one percent of weight-conscious consumers said they read the nutritional panel on product labels, and 72 percent of respondents not watching their weight reported reading it as well.

Health (or the appearance of health) sells. Sixty-six percent of consumers at least occasionally buy food because of a specific healthy ingredient, according to Packaged Facts consumer insights survey data. And the Hudson Institute, a nonpartisan policy research organization, found that lower-calorie products from companies such as General Mills, Kraft Foods and Campbell Soup drove 82 percent of sales growth from 2006 to 2011.

Surprisingly, it's not the uninformed consumer who succumbs to healthy-sounding or healthy-looking products.

But companies may be tumbling toward a questionable extreme. In 2013, Kellogg's agreed to a $4 million settlement of a class-action lawsuit that accused the company of falsely advertising Frosted Mini-Wheats as a food that improves kids' memory and attentiveness. Anyone who bought Frosted Mini-Wheats during several months in 2008 and 2009 is entitled to $5 per box back from the fund, up to $15 total. (Kellogg's admitted no wrongdoing.) Additionally, at the end of 2012, Dr. Pepper Snapple Group was sued because its Cherry Antioxidant, Mixed Berry Antioxidant and Pomegranate Antioxidant 7UP soda names were, plaintiffs alleged, misleading. The beverages were simply sweet soda plus vitamin E at levels not shown to provide significant health benefits; they did not include any of the healthful fruits pictured on the packages. The sodas were pulled from shelves—for unrelated reasons, says the company.

But there is more going on. Just the overall impression that you're eating a healthy product—because of a litany of claims on the package or just a healthy-looking design—strongly influences how you perceive the food and how much of it you eat.

Surprisingly, it's not the uninformed consumer who succumbs to healthy-sounding or healthy-looking products. The people who are most influenced are the people who care about the food being healthy and environmentally responsible.

In other words, you.

The Power of Packaging

Jonathon Schuldt, Ph.D., runs a lab out of Cornell's Department of Communication. A few years ago, Schuldt, an assistant professor who studies health claims and food labeling, noticed the increasing number of health-related labels, like calorie labels, on the front of food packages: "A lot of them are candy company products, and I thought it was interesting that the color of the calorie label was green."

Green can mean a lot of things, thought Schuldt: natural, environmental, healthy and "go." But not, usually, candy. So he decided to do a study. He sat students down at PCs in his computer labs and told them a story. He said, imagine you're waiting in the checkout lane of a grocery store, and you're hungry. You notice a candy bar (shown on the computer screen), and on the front of the wrapper is a label showing the calorie content. Look carefully at the candy bar and answer the questions below it.

The candy bar was the same, but half the students saw calorie labels in green and half saw them in red. After studying the picture and answering the questions, students rated the healthiness of the bars. The results: overall they believed the green-labeled candy bars were healthier than the red ones, even though they had the same number of calories.

Next, Schuldt compared green labels to white ones, this time in an online survey, and also asked the subjects several questions that sussed out how health-conscious they were. Turns out, the people who reported being really health-conscious judged a candy bar to be more healthful when it bore a green label. In people who weren't health-conscious? No effect at all. Schuldt writes that "consumers who are motivated to choose healthy foods, in particular, may be swayed by green nutrition labels."

The phenomenon extends beyond health claims.

Schuldt also found that people who care about their own health or the environment also perceive foods labeled "organic" or "fair trade" to be lower in calories. Although, of course, calories are absolutely unrelated to whether something is organic or whether workers are treated properly.

"You get a halo: healthy is good, ethical is good, so ethical must be healthy. It's faulty logic," says Schuldt. So, people who care about being healthy, who want to make healthy choices, are more likely to be swayed by the appearance of a healthy-looking label. And the biases are not just theoretical.

In 2013, Harvard Law School's Food Law Society sponsored a conference called the Forum on Food Labeling. Mostly it dealt with the legality of labeling and how to regulate it, but near the end of the conference Harvard School of Public Health researcher Christina Roberto, Ph.D., a psychologist and epidemiologist who studies public health policies to reduce obesity, riveted the crowd with a series of studies on labels and how they wheedle their way into our perceptions and change our behavior. One such study used a chocolate bar as its divining rod. The researchers recruited 51 students, divided them into three groups, gave two groups a piece of the same chocolate bar, but framed the bar in different ways: the people in group one ate "a new health bar containing high levels of protein, vitamins and fiber and no artificial sweeteners," the people in group two ate "a chocolate bar that is very tasty and yummy with a chocolate raspberry core," and the people in group three were the controls, receiving no bar. Subjects filled out surveys on how the bars tasted, how healthy they were and how hungry they felt before and after the snack.

The people who ate a "healthy" bar later reported

being hungrier than those who ate a "tasty" bar, and even hungrier than those in the control group who ate nothing. So the researchers took this work one step deeper. They gave 62 different subjects a quarter slice of bread, framed as either "nutritious, low-fat and full of vitamins" or "tasty, with a thick crust and soft center." The subjects rated how healthy their bread was, after which they left the room and the experimenter told them the study was over.

Right afterward, the experimenters put the subjects in another room for an ostensibly unrelated study, filling out a questionnaire about their study habits. There were bowls of large pretzels on the table and the researchers said they were left over from another study and the participants could grab a few while answering the questions. But, as I'm sure you can guess, the original study had never ended. The subjects snacked as they filled out the form, and after they left the researchers counted and weighed the remaining pretzels to see how much they ate.

What you think about what you're eating may have as big an effect on your appetite as what you're actually consuming.

Turns out, subjects who got the "healthy" bread ate significantly more pretzels later on than those who ate the "tasty" bread (exactly the same bread). The only difference? The perception, the claims.

"These labels influence your perception of hunger, and that, in turn, leads to how much you're actually eating," Roberto said at the conference. "So this is a chain that's really impacting consumer behavior."

It goes still further than behavior. At the Yale Clinical Research Center in 2010, 46 people were hooked to an IV and fed a milkshake. Before they drank it, half of them saw a pastel purple and blue label with practical-looking lettering and a suggestive hourglass shape. The shake was called a "Sensi-Shake," with "Guilt Free Satisfaction" emblazoned on the front. A front-of-pack tab showed "0% fat, 0 added sugar, and 140 calories!" The other group of participants saw a shake called "Indulgence," with a deep-red label and the phrase "Decadence You Deserve." No health claims were made on this one, though the Nutrition Facts panel listed 620 calories per serving and the descriptor on the front said the shake was smooth, creamy, rich and delicious.

Of course, it was the same shake and it contained 380 calories. The researchers were testing subjects' blood for ghrelin, a hormone that is secreted from an empty stomach and travels to the brain, where it binds to receptors and makes you feel hungry and want to eat. As you eat, and the gastrointestinal tract detects nutrients, ghrelin is suppressed, which tells the brain to reduce appetite and make you feel full. But the research showed the relationship is not that simple.

In people with the "indulgence" mind-set, ghrelin increased steeply as they hungrily anticipated drinking the shake, and then fell precipitously after they consumed it. They craved it, and then were satisfied and full afterward.

But in people with the "sensible" mind-set, ghrelin levels were completely different: fairly flat. After consumption, the participants did not feel physiologically satisfied, even though they drank the same number of calories as the indulgence group. Based on the participants' ghrelin response, you'd think the two groups actually drank different beverages. What you think about what you're eating may have as big an effect on your appetite as what you're actually consuming. "This is why we need to care a lot about these labels," said Roberto during her talk.

Nutrition Puffery

Food packaging has a long history, but it wasn't until 1994 that companies were forced to present standardized nutrition and health information on practically all food packages. The Nutrition Facts panel was added, and statements like "low sodium," "high fiber" and "reduced fat" were regulated. Additionally, the term "healthy" may only be used if a food meets certain requirements—such as low fat, low saturated fat, low sodium, low cholesterol, and contains at least 10 percent of your daily value for certain nutrients. Further, the FDA regulates a spectrum of so-called health claims—some more stringently than others.

With the recent proliferation of claims on packages, though, "we've seen the emergence of claims that may not provide the full picture of their products' true nutritional value," said FDA commissioner

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THERE IS A TABBED BANNER OF NUTRITION INFORMATION ON THE FRONT OF CERTAIN PRODUCTS THAT SHOWS NUMBERS FOR SATURATED FAT, SODIUM, SUGAR AND CALORIES.

Margaret Hamburg, M.D., in a 2009 speech at the National Food Policy Conference. She added, "It will be important to reestablish a science-based approach to protect the public. . . ." This was true when Hamburg said it in 2009, and it remains true today.

So in 2010 the FDA sent warning letters to 17 food manufacturers for violating various labeling regulations. Transgressions included Nestle's Drumsticks ice cream cones claiming zero grams of trans fat on the front of the package, but not pointing consumers to the high levels of saturated fat and total fat. And products claiming to be "healthy" were not meeting the FDA's criteria for the claim. A quick jaunt through the grocery store reveals packages that boast plenty of health-related claims, some taking advantage of the loose regulations. This isn't surprising when you consider studies have shown consumers can't tell the difference between rigorous health claims and flimsier so-called structure/function claims. In addition, consumers prefer those lighter, more sexy-sounding claims because they sound more positive: take Green Giant's "healthy vision" vegetables "with natural antioxidants Lutein & Vitamin A to help support healthy eyesight," complete with rosemary butter sauce. This product helps eyesight no more than any other similar vegetable assortment, but the packaging makes you think it's much better for you.

A Confusing Morass

One new initiative is front-of-package labeling. It aims to create a standardized system that can be placed on all products to give consumers a sense of how one product compares nutritionally to another. The first big push for front-of-package labeling came in 2009, when Kellogg's partnered with several other major food companies, such as Kraft and Unilever, to create the Smart Choices program. With Smart Choices, a green check mark adorned "healthy" food packages. But "healthy" was defined solely by the consortium, and after the program came out, experts started questioning how nutritious some of the "healthy" foods were.

Christina Roberto and others did a study showing that 64 percent of "Smart Choices" products did not meet standardized nutrition criteria for a healthy food. After a congresswoman and attorney general called for investigations into the program and by the time Roberto's study was published, the program had been pulled. It lasted less than a year.

The timing seemed perfect, then, when the FDA swooped in, in 2010, and announced plans to develop a standardized front-of-package label and appointed the Institute of Medicine (IOM) to develop criteria and a design for such a label. But before the FDA could issue its own ruling on the matter, the Grocery Manufacturers Association and the Food Marketing Institute suddenly implemented their own front-of-package label in 2011, surprising many. Called Facts Up Front (originally called Nutrition Keys), the label displays nutrition information on the front of a product in a series of tabs, and it is emblazoned on many packaged foods today. The label features four basic nutrient categories: calories, saturated fat, sodium and sugars. But it can also include up to two "nutrients to encourage."

"From a public health point of view, it isn't the best strategy," said Roberto. "The companies have the ability to cherry-pick nutrients to highlight on foods that may not be so good for you."

Some grocery stores are developing labeling programs as well, which appear on shelf tags: Hannaford was the first, launching its Guiding Stars system in 2006. A 2017 study showed that shoppers benefit when using Guiding Stars—choosing foods with more omega-3's or fiber, and skipping foods shown to be high in trans fat or sugar. Other grocery stores have followed suit with either their own rating systems or the independent scoring system NuVal.

"So now you've got labels on packaging, companies' own labels, shelf tags in the supermarket. What a mess," says Roberto.

Cutting Through the Clutter

Roberto muses on her fears for the future of packaging. "As a society, we're becoming more and more conscious of obesity and poor diet, and what I'm worried about is that companies are going to capitalize on that by doing more marketing around health," she says. "The problem is, they won't be marketing healthy food, necessarily. They'll be touting the health attributes of unhealthy products."

Food companies frame a product with its package. They control how we think about the food inside, whether we expect it to be healthy or not, how tasty we think it will be, how much we eat in a sitting, and even how hungry it will make us. And packages are very alluring.

Perhaps, then, we are better off eating things that don't need labels. If you do eat labeled food (and let's be honest, we all do), buyer beware: the marketed "better for you" version isn't always healthier. In fact, indulging (moderately) in the "regular" version might just be the best choice.

Back at the supermarket, I push my cart away from the center of the store toward the outskirts, where the whole foods are. It may be unrealistic to think of a world where food doesn't exist in packages, but there are places with fewer packages: community co-ops, farmers' markets. When I reach the produce section, I pick up some green apples and put them in my own bag. I want to eat food I can label myself. ●

A History of Food Labels

Highlights of the landmark moments that made us smarter consumers.

By Hemi Weingarten

1862
President Lincoln launches the Department of Agriculture (USDA) and the Bureau of Chemistry (originally called the Division of Chemistry), the predecessor of the Food and Drug Administration (FDA).

1958
The FDA publishes the first list of food substances and additives generally recognized as safe (GRAS).

1966
The Fair Packaging and Labeling Act requires all consumer products in interstate commerce to be honestly and informatively labeled, including food.

1994
The Nutrition Facts panel, with basic per-serving nutritional information, is required on most foods.

2003
The FDA announces plans to permit manufacturers of food products sold in the United States to make health claims that are supported by less than conclusive evidence.

2010
The USDA requires cuts of meat to display nutrition on the package.

2016
The FDA announces the new Nutrition Facts label, with a focus on updated nutritional science.

2020
On January 1, all large food manufacturers adopted the FDA's new food label instructions. Smaller companies, with less than $10 million in annual sales, had an extra year to transition.

NAVIGATING NUTRITION LABEL UPGRADES

Recently, the Nutrition Facts label got a makeover. Here are the changes and how they can help you make smarter choices in the grocery aisles.

By Bailey McGrath

AFTER 20-PLUS YEARS, THE FDA HAS OVERHAULED its Nutrition Facts label to reflect the latest research and dietary recommendations. Nutrition labels can tell you a lot about what you eat, but reading them isn't always so simple. With heaps of research pointing directly to diet as a major cause of obesity, heart disease, prediabetes and type 2 diabetes, the updated label should help you make smarter eating choices (no more sneaky sugars!).

"Very soon, you will no longer need a microscope, a calculator or a degree in nutrition to figure out whether the food you're buying is actually good for our kids," Michelle Obama said as she unveiled the new label in 2016. "That's a phenomenal achievement."

"We support this because we believe in giving consumers more transparency," said Brad Figel, vice president of public affairs for Mars in North America, before the changes were widely implemented. Figel had worked toward the original July 2018 deadline before the date was pushed to January 2020 for big food manufacturers. "The fact that we'll have the added sugar declaration and the percent daily value, but our competitors won't? That just ends up confusing consumers."

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MANUFACTURERS ARE NO LONGER REQUIRED TO LIST VITAMINS A AND C. THE AMERICAN DIET USED TO BE DEFICIENT IN BOTH, BUT MOST PEOPLE NOW MEET THEIR DAILY QUOTA. CALCIUM AND IRON STAYED ON.

What Has Changed

While many companies have already made these changes voluntarily, here's what you can look for.

1. SERVING SIZE

It reflects the amount typically consumed. For example, both 12-ounce and 20-ounce sodas list one serving, because most people drink the whole bottle. But these aren't recommended servings, so adjust how much you finish according to your food plan.

2. CALORIES

Calories per serving are bigger and easier to read.

3. TOTAL FAT

"Calories from Fat" are gone because research shows that the type of fat you eat is more important than the amount.

4. ADDED SUGARS

You can find out how much sugar the manufacturer adds during processing under "Total Carbohydrate." Unlike naturally occurring sugars found in fruits and milk, added sugars—such as white sugar and high-fructose corn syrup—offer no nutritional benefit. Quick label-reading tip: four grams of added sugar equals one teaspoon.

5. VITAMIN D & POTASSIUM

These nutrients have been added. The typical American diet is deficient in both. Vitamin D promotes bone health and boosts immunity, and potassium helps regulate blood pressure. Vitamins and minerals are listed in grams in addition to their daily value percentage.

CHAPTER THREE

The Power of Plant-Based

Incorporating more fruits and vegetables into your family's diet has proven links to a healthier life. Here's why, and how, to pile on the produce.

THE MEATLESS DIFFERENCE

Vegetarian eating has been linked to protection against a variety of conditions and illnesses. Here are some potential benefits.

By Rachael Moeller Gorman

YOU'LL LOWER YOUR RISK OF HEART DISEASE. Cardiovascular health, in particular, seems to be better in vegetarians. Back in 1999, researchers at the University of Oxford in the U.K. pulled together data from five major observational studies that followed the lives of 27,808 vegetarians for an average of 10.6 years. ("Vegetarian" is defined as people who either answered yes to the question "Are you a vegetarian?" or those who said they don't eat any meat or fish). They compared how many vegetarians died from various causes (heart disease, types of cancer) to how many nonvegetarians died from the same causes.

These studies amassed huge amounts of information on what these people ate, which diseases they had, and when and how they died. The results: committed vegetarians—those who had stuck with the lifestyle for more than five years—were 26 percent less likely to die of ischemic heart disease (coronary artery disease) than people who regularly ate meat. People who ate meat only occasionally (a few times a month) were 20 percent less likely to die of heart disease.

But why? Nuts seem to be one major reason. Some of the most important studies of vegetarians find that those who eat nuts more than four times a week suffer fewer than half as many heart attacks as people who eat nuts less than once a week. One possible reason: many nuts or legumes, such as peanuts, contain little saturated

fat and are high in mono- and polyunsaturated fats, which have been shown to lower bad LDL cholesterol.

YOU'LL KEEP CHOLESTEROL IN CHECK. In general, vegetarians tend to have lower total and LDL cholesterol levels, and researchers are finding that these lower cholesterol levels probably explain much of vegetarians' protection from heart disease (high cholesterol contributes to plaques in our arteries, increasing the risk of heart attack). In addition to eating more nuts, vegetarians' avoidance of meat—with its often high saturated fat—helps keep cholesterol levels healthy. Higher levels of fiber and plant sterols (cholesterol-like chemicals in plants that block our body's absorption of cholesterol) in vegetarian diets probably also help keep cholesterol at bay. What's more, many vegetarians rely on soy as a protein source—and soy appears to reduce blood cholesterol by helping the liver clear more LDL from the body.

YOUR BLOOD PRESSURE WILL IMPROVE. Like high cholesterol, high blood pressure (a.k.a. hypertension) is a risk for cardiovascular disease, and it too seems to be lessened with a meat-free, vegetable-rich lifestyle. In the Inland Empire region of Southern California, in the city of Loma Linda, the Seventh-Day Adventist Church flourishes. Adventists often avoid meat, alcohol and cigarettes, and since the 1950s studies have been watching these folks to see how their choices affect their health. In a 2009 report on a study of 89,224 Adventists, semivegetarians (people who eat red meat, poultry and fish less than once a week) had a 23 percent reduction in relative risk of hypertension when compared to people who ate red meat, poultry and fish more than once a week. The more restrictive a person's diet was, the lower his chance of developing high blood pressure. Vegans—who don't consume any animal products at all—showed a risk reduction that was an amazing 75 percent lower than meat eaters' risk. A 2014 report analyzed hundreds of articles and studies to assess the health benefits of vegetarian diets. The researchers found that vegetarians had a 55 percent lower risk of developing hypertension.

These findings could be the result of the high levels of potassium (which impacts blood pressure by working with sodium to maintain fluid levels in the body), magnesium (which helps blood vessels relax), antioxidants and fiber inherent in a vegetable-rich diet. All of those have been linked to lower blood pressure.

YOU'LL GET LEANER. Lower blood pressure might be the product of something else altogether: lower weight. The 2014 study found that the amount of meat in one's diet was directly related to that person's body mass index (BMI), an estimate of body fat calculated from height and weight. In short, the less meat someone ate, the lower her BMI was.

In another large observational study on vegetarians in the U.K., people who cut back on animal-based foods (moving from meat eater to vegetarian to vegan, or any step along that path) gained less weight over a five-year period than those who didn't. (In general, people tend to gain weight over time, especially after metabolism slows around age 30.)

YOUR RISK OF DIABETES WILL DECLINE. Another positive find from the study of the Seventh-Day Adventists: the fewer animal products a person eats, the lower his risk of diabetes. A 2017 study from the Singapore Chinese Health Study, which recruited more than 63,000 adults between 1993 and 1998, found links between red meat and poultry consumption and a risk of developing diabetes. The quartile with the highest red meat and poultry intake had a 23 percent increase in diabetes risk. The study found that swapping fish and shellfish for meat and poultry reduced the risk as well.

YOU MAY PROTECT YOURSELF AGAINST CANCER AND OTHER DISEASES. It would seem that a meatless diet that's high in antioxidant-rich vegetables, whole grains, legumes and nuts would protect against cancer too—but the research isn't so clear. However, red meat has been linked to an increased risk of colon and colorectal cancer in several studies (though others found no such link). And a large

compilation of research from the U.K. shows that the risk of several cancers, including stomach and ovarian cancers, may be lower among vegetarians. Reducing risk of cancer could be part of the reason to choose a more meatless lifestyle, but at this point the science isn't strong enough for it to be the sole reason. Studies, like a pooled analysis of data from the Oxford Vegetarian Study and EPIC-Oxford, found that seafood eaters had a lower risk of some cancers than vegetarians.

Limited research shows that being a vegetarian might protect you from renal disease (eating a lot of protein, as is found in animal products, for a long period of time may overwork and injure the kidneys), dementia (perhaps due to the lower blood pressure or higher antioxidant intake of vegetarians), diverticulitis (fiber is most likely the key protective factor) and gallstones (which can be caused by too much cholesterol).

Not every study on vegetarian diets supports all of the health benefits mentioned above—partly because it's tricky to study vegetarians, as they're defined by what they don't eat and what they do eat is purely a matter of personal choice.

YOU'LL KEEP YOUR WHOLE FAMILY HEALTHY. When a family sits down at the dinner table for the evening meal, there's no menu. There's no buffet. Every member of the family eats the same food, which begs the question: are vegetarian diets good for everyone, even young children? Indeed they are, says the American Dietetic Association, which states in its position paper on vegetarian diets, "Well-planned vegetarian diets are appropriate for individuals during all stages of the life cycle, including pregnancy, lactation, infancy, childhood and adolescence." As long as meal planning is thoughtful and thorough, lacto-vegetarian, lacto-ovo-vegetarian and vegan diets can fill all the nutrient needs of every family member.

Research suggests growth and development of vegetarians are similar to nonvegetarians: in a British study, 390 lifelong vegetarians grew just as tall as people who became vegetarian after age 20. Also women first menstruated at the same age as well—thus, physical development was not delayed in vegetarians. Lacto-ovo-vegetarian kids are about the same size as meat eaters, though some studies suggest that younger vegan kids are a bit shorter, though still within normal range. On the plus side, studies have shown that vegetarian children and adolescents consume less saturated fat and cholesterol, and have higher intakes of fruits, vegetables and fiber, than nonvegetarians. They are also slimmer and have lower cholesterol levels. It is important for these kids to focus on getting enough calcium, vitamin D, iron, zinc and vitamin B12. Even if you're pregnant or breastfeeding, eating vegetarian can be healthy, as long as you give it careful consideration. Iron is a nutrient of particular concern—iron deficiency is common in any pregnancy, especially so in vegetarian women, and can cause harm to developing fetal organs. Some research has shown that vitamin B12, calcium and zinc can also be lower in vegetarians. But of the few studies that have been conducted, babies born to vegetarians and those born to meat eaters are equally healthy.

A 2015 review of 22 observational studies of vegan and vegetarian pregnant subjects found no major increase in birth defects or other serious problems. But the studies examined healthy women, and the authors agree that more research is needed to determine how a vegan or vegetarian diet would impact the pregnancy of women with certain health conditions or diseases.

DHA—an omega-3 fat found mostly in fatty fish, important for brain development—is another concern. Some studies have shown that infants of vegetarian mothers have less DHA in their umbilical-cord blood and that the breast milk they drink is also lower in DHA. (Suggestions of food sources for pregnant women—and everyone else—to get adequate amounts of iron, B12, vitamin D and omega-3s are on the opposite page.)

Older adults can also thrive on a meatless regime. Though older people need fewer calories, they need more calcium,

vitamin D and vitamin B6. And, as in all vegetarians, especially vegans, vitamin B12, which you get mainly from animal-based foods, remains a priority, since our ability to absorb B12 from food declines as we age, as does our ability to produce vitamin D from the sun.

YOU'LL SAVE MONEY. Although meat is relatively inexpensive at the supermarket (due to government subsidies), a thoughtful vegetarian diet full of whole foods can be much cheaper. A pound of flank steak, about 200 grams of protein, costs about $7 to $10. A pound of black beans plus two and a half pounds of brown rice, which together contain about 200 grams of complete vegetarian protein, costs about $5. Indeed, a study comparing a week's worth of family vegetarian meals to a week's worth of nonvegetarian meals found that the vegetarian meals cost 20 percent less than the meat-based ones. (If you choose processed meat substitutes, like veggie burgers, however, you'll spend more, so stick to whole foods.)

Healthy vegetarian meals are easy and affordable, as long as you plan carefully. Just as an omnivore must carefully consider the foods she buys to make sure her family is eating a well-balanced diet, so must a vegetarian.

Replacing saturated-fat-packed meats with saturated-fat-packed dairy and eggs won't help your health, and piling on refined carbohydrates will only make you hungry sooner. A bad vegetarian diet is just as unhealthy as any other unhealthy diet. ●

The Vegetarian Spectrum

People who avoid meat generally tend to follow four main types of vegetarian diets. Here are the common groupings of vegetarian eating and what nutrients people in each category need to be concerned about.

SEMI-MEATLESS

EATS Some meat, poultry and fish; milk, eggs, fruits, vegetables, legumes, whole grains.
AVOIDS Meat several days a week.
NEEDS Iron, via either red meat or dark poultry meat or plant-based sources like legumes and spinach, plus vitamin C–rich foods like orange juice; fish for omega-3 fats; soy products, peanuts and legumes for zinc.
SHOULD CONSIDER these supplements: a multivitamin for extra insurance overall.

PESCO-VEGETARIAN

EATS Fish, milk, eggs, fruits, vegetables, legumes, whole grains.
AVOIDS Meat, poultry.
NEEDS Fortified foods, such as cereals, to supplement nutrients that meat typically provides, such as iron; in addition, plant-based iron sources like legumes and spinach and vitamin C–rich foods like orange juice; soy products, cashews and legumes for adequate zinc.
SHOULD CONSIDER these supplements: a multivitamin, in particular to ensure adequate iron.

LACTO-OVO-VEGETARIAN

EATS Milk, eggs, fruits, vegetables, legumes, whole grains.
AVOIDS Meat, poultry, fish.
NEEDS Cereals and other fortified foods to supplement nutrients, such as vitamin B12 and iron; milk for calcium and vitamin D; whole grains along with sources of vitamin C; iodized salt.
SHOULD CONSIDER these supplements: a multivitamin to ensure adequate B12 and iron; omega-3 fats.

VEGAN

EATS Fruits, vegetables, legumes, whole grains.
AVOIDS Meat, dairy, fish, eggs and sometimes other animal-derived foods, such as honey and gelatin.
NEEDS Same calcium, vitamin D and vitamin B12 as other diet types; a mix of soy, grains and beans (for protein); plant sources of iron; same sources for zinc.
SHOULD CONSIDER these supplements: a multivitamin to ensure adequate B12, iron, calcium and vitamin D; omega-3 fats.

PRODUCE PROTECTION

Although your overall diet is more important than eating a targeted quota of fruits and vegetables, research shows that these foods may be particularly potent when it comes to cancer prevention.

By Laura Beil · Photography by Leigh Beisch

Nuts

One of the largest studies to look at the protective effects of eating nuts was published in November 2013 in the *New England Journal of Medicine*: those who ate one ounce of nuts at least five times a week were 11 percent less likely to die from any kind of cancer. Of particular interest are walnuts, which have been shown in animal studies to impede the growth of tumor cells. For example, one study in the journal *Nutrition* found walnuts inhibited the growth of colorectal cancer in mice. The reasons for the protective effects of nuts are still being studied, but researchers point to a number of compounds that appear to slow cancer, including resveratrol, ellagitannins, anacardic acid and omega-3 and omega-6 fatty acids.

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MAKE A RELISH WITH CHOPPED BLUEBERRIES, ORANGE ZEST, SHALLOT AND JALAPEÑO. SERVE WITH TORTILLA CHIPS.

Berries

Berries get their rich color from compounds called anthocyanins, which act as potent antioxidants and shield cells from damage. Berries also contain ellagic acid and vitamin C. In lab studies, these compounds appear to stymie the growth of a long list of tumors, including those of the breast, cervix, skin, lungs and digestive tract. In one study, researchers from Georgetown University School of Medicine added black raspberries into the diet of mice with breast cancer and found that, after six months, their tumors were 70 percent smaller than those of mice on the control diet. People are not mice, of course, but promising findings like this have led to human studies with berry compounds. In one report, volunteers who ate blueberry powder daily (the equivalent of 1⅔ cups of fresh blueberries) for six weeks experienced rises in natural killer cells, an immune system component involved in fighting cancer.

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ADD KALE TO A SMOOTHIE MADE WITH FROZEN BANANA, APPLE, PINEAPPLE AND PLAIN YOGURT.

Cruciferous Vegetables

Broccoli has long been a star in the cancer-prevention world, dating back to studies two decades ago that found an association between eating cruciferous vegetables and a lower risk of cancer. Further research found high amounts of potentially anticancer compounds in broccoli and broccoli sprouts. Crucifers—which include other members of the cabbage family, like cauliflower, Brussels sprouts and kale—have a complex chemical composition, so it is unclear what in particular is giving them their cancer-fighting power. They are rich in potassium, folate, vitamin C and a cocktail of phytochemicals, all of which might help. Lab studies suggest sulforaphane, a compound particularly abundant in fresh broccoli (not frozen), might make cells less susceptible to carcinogens.

Despite the numerous potentially cancer-killing compounds, studies in people haven't consistently found protection. But a 2013 analysis in the *Annals of Oncology* found that people who ate the most crucifers lowered their colon cancer risk by 18 percent compared with those who ate the least. More recent studies have also seen reductions in risk for prostate and lung cancers.

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TOSS DRAINED CHICKPEAS WITH CORN OIL AND YOUR CHOICE OF SPICE BLEND. BAKE AT 400°F UNTIL CRISPY AND GOLDEN, STIRRING ONCE OR TWICE, 30 TO 40 MINUTES.

Legumes

Beans are loaded with fiber and protein, which could help you feel full on fewer calories and thus lower your risk of obesity (and therefore cancer risk). Their fiber content feeds the healthy bacteria in the intestine and keeps the cells lining the digestive tract healthy, also minimizing cancer risk. They also contain folate—associated with reduced risk of colorectal, breast and other cancers. Whatever the reason, regularly eating legumes can be powerful, especially on cancers of the digestive system: in one study out of Loma Linda University, people who ate legumes at least three times a week cut their risk of colon cancer by 33 percent.

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DICE WATERMELON, RED ONION AND TOMATO; TOSS WITH BASIL AND FETA CHEESE.

Red and Pink Produce

Tomatoes get their ruddy color from lycopene, which also makes grapefruit, watermelon and papaya pink. In animal studies, lycopene has been shown to protect against prostate and colorectal cancer. Though studies have been provocative, they have not been consistent in people. A 2014 study reported that men who ate 10 servings of tomatoes a week (compared with men who seldom ate them) had an 18 percent lower risk of developing prostate cancer. Here's a twist for pasta lovers: go for the sauce, because studies suggest that eating cooked tomatoes may result in higher blood levels of lycopene than noshing on raw tomatoes or drinking tomato juice. (Cooking perhaps makes the compound easier to absorb.)

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CARAMELIZE ONIONS UNTIL SOFT AND GOLDEN AND USE AS A TOPPING FOR SANDWICHES OR PIZZA.

Allium Vegetables

Pungent vegetables in this class include onions, leeks and chives, but garlic has been the standout for cancer protection. A 2014 review published in the journal *Cancer Prevention Research* concluded that the strongest evidence of cancer defense is for onions and garlic against digestive tract cancers—and other research suggests garlic lovers are less likely to develop pancreatic and breast tumors. However, there is not yet enough evidence to say exactly how much you need to eat to lower your cancer risk. And despite claims either way, research has not yet concluded whether eating garlic raw or cooking the allium vegetable is best for fighting cancer.

BITTER IS BETTER

Don't turn up your nose at bitter foods—embrace them! Bitter is a sign of powerfully good-for-you nutrients. We look at the science and give you tips to embrace the taste.

By Shaun Dreisbach

FUNNY THING ABOUT BRUSSELS SPROUTS: THEY are hands down the most hated vegetable in America (polls have validated it), and yet these bitter little guys are seriously good for us—if only we would, you know, actually eat them. Even more ironic is the fact that the compounds that give Brussels sprouts their bitter taste are the same ones that have been shown to help protect against diseases such as cancer. That's true for other bitter fruits and veggies—broccoli rabe, grapefruit, mustard greens—as well. And most of us are equally opposed to them, at least in their raw, un-futzed-with form. In fact, studies show that about 75 percent of people don't like the taste of these foods—and a quarter of those (called "super-tasters") are averse to the point of flat-out revulsion. That leaves only a small 25 percent of the population who can happily munch platefuls of broccoli rabe and radicchio—and reap the health

benefits—with no clue what everyone else is complaining about. Bitter foods are estimated to make up just 5 percent to 8 percent of Americans' diets. But in Indonesia, where bitter melon, dark leafy greens and tamarind are what grow outside your door, they're an integral part of the cuisine—and even considered curative comfort foods.

To be clear: It's not that we don't like the *flavor* of these foods—we actually don't like the taste. And there's a big difference between the two. "Flavor is a combination of three sensory experiences—taste, smell and texture," explains Barb Stuckey, author of *Taste What You're Missing*. And there are only six things we can actually taste: sweet, sour, bitter, salt, umami (a savory taste that comes from certain amino acids in foods like Parmesan cheese and mushrooms) and fat. "You can smell the freshness of a lemon, for example, but what you taste is sour," says Stuckey. "The unique thing about taste is that it's a contact sense, like touch." Which is why bitter foods make you grimace—they're triggering a physical reaction.

There are more than 550 bitter compounds that we can detect, and many of them are packed with benefits. Many plants have multiple bitter compounds (broccoli has 35), but there are key sources of each compound. Some foods taste more bitter than others—and some don't seem bitter at all. Glucosinolates, found in cruciferous vegetables like arugula and Brussels sprouts, have been shown to prevent cancer and the progression of cancer. Grapefruit contains naringin, which is associated with improvements in diabetes, obesity and cognitive diseases.

Soybeans and tofu might not strike you as bitter foods, but two of the components of isoflavones—genistein and daidzein—read as subtly bitter to our taste buds and may explain why soy tastes bad to some people. Isoflavones have been linked to a lower risk of some cancers and improvements in blood and oxygen flow and bone density. Berries, cherries and peaches taste sweet, not bitter, but their bitter compounds give them their vibrant hue, and improve vision while also protecting against aging, heart disease and cancer. The antimicrobial properties they possess may even help prevent foodborne illnesses by killing pathogens before they have a chance to make us sick. ●

Five Ways You Can Learn to Love Bitter

With some culinary craftiness, you can teach yourself to enjoy bitter foods. Here are a few strategies:

1. TRY, TRY AGAIN

Repeated exposure is the number-one way to learn to enjoy bitter foods, according to Barb Stuckey. Studies show that after about eight tries your taste buds may start to come around.

2. FATTEN IT UP

"Think of black coffee. It's very bitter—but add some cream and the fat will help mitigate that bitterness and improve the texture, so the overall flavor is better," says Stuckey. When you massage kale with oil, the fat masks the bitterness and massaging it helps break down some of the fibers in the leaves.

3. SWEETEN IT

The natural sugars in wine are what make it taste less bitter and unpleasant to us than, say, a raw cranberry (though they share the same bitter compounds). Sprinkle a little sugar on your grapefruit, or honey in your tea.

4. SALT IT

"Salt is the best way to mask bitterness," notes Stuckey. Try a finishing salt, like Maldon, on bitter veggies. There's evidence that if you salt at the end of cooking you'll taste the salt more and use less overall.

5. EASE OFF THE EXTRAS

"If you don't like tea, for example, start with as much sugar and lemon as you need and then start backing off," says Stuckey. "One day, you'll be able to eliminate them completely, because you'll be so used to the flavor."

Vegetable Imposters

Milanese, the traditional Italian preparation of breading meat then sautéing it until crispy, is just the treatment for these cauliflower steaks.

Cauliflower Steaks Milanese with Salsa Verde

ACTIVE 30 min **TOTAL** 1¼ hrs

CAULIFLOWER STEAKS

- Olive oil cooking spray
- 2 medium heads cauliflower (about 1½ pounds each)
- 3 tablespoons cornstarch
- 2 large eggs
- ¼ teaspoon salt
- 1 cup whole-wheat panko bread crumbs
- ⅓ cup finely grated Parmesan cheese
- ½ teaspoon ground pepper

SALSA VERDE

- ½ cup extra-virgin olive oil
- ¼ cup chopped fresh parsley
- 1 tablespoon capers, rinsed and chopped
- 1 tablespoon lemon zest
- 1 clove garlic, grated
- ¼ teaspoon crushed red pepper
- ¼ teaspoon salt

1. To prepare cauliflower steaks: Preheat oven to 400°F. Generously coat a baking sheet with cooking spray.

2. Remove any leaves from each head of cauliflower but leave the stem intact. Place on a cutting board, stem side up. Using a large chef's knife, cut each head through the stem into 2 equal halves. Cut a 1-inch-thick slice from each half. Reserve the remaining cauliflower for another use.

3. Place cornstarch in a shallow dish. Lightly beat eggs with salt in another shallow dish. Combine panko, Parmesan and pepper in a third shallow dish. Coat each cauliflower steak in the cornstarch, shaking off any excess. Dip in the egg and let any excess drip off. Coat with the panko mixture. Place on the prepared baking sheet. Generously coat both sides of the cauliflower with cooking spray.

4. Bake, turning the steaks over and rotating the pan from back to front halfway through, until the cauliflower is tender and the coating is crispy, 45 to 55 minutes.

5. Meanwhile, prepare salsa verde: Combine oil, parsley, capers, lemon zest, garlic, crushed red pepper and salt in a small bowl. Serve with the cauliflower.

SERVES 4 1 cauliflower steak and 2 tablespoons salsa verde each

CAL 438 / **FAT** 34G (SAT 6G) / **CHOL** 59MG / **CARBS** 26G / **TOTAL SUGARS** 5G (ADDED 0G) / **PROTEIN** 10G / **FIBER** 7G / **SODIUM** 455MG / **POTASSIUM** 740MG

Beet Larb with Quinoa

ACTIVE 45 min **TOTAL** 45 min

3 tablespoons black rice
¾ cup quinoa
1½ cups water plus 2 tablespoons, divided
¼ cup lime juice
¼ cup chopped scallions
2 tablespoons chopped fresh cilantro
2 tablespoons fish sauce
2 teaspoons light brown sugar
½ teaspoon crushed red pepper
2 tablespoons canola oil
1 pound red beets, peeled and finely chopped (3 cups)
1 cup shredded cabbage
1 cup sliced cucumber
1 cup fresh Thai basil *and/or* mint leaves
½ cup julienned carrot

1. Place rice in a large skillet over medium-low heat. Cook, stirring occasionally, until well-toasted and starting to pop, 5 to 8 minutes. Grind to a fine powder in a spice grinder or with a mortar and pestle. Set aside.

2. Combine quinoa and 1½ cups water in a medium saucepan. Bring to a boil over high heat. Reduce heat to low, cover and simmer until tender and most of the liquid has been absorbed, 15 to 20 minutes. Fluff with a fork.

3. Meanwhile, combine the remaining 2 tablespoons water, lime juice, scallions, cilantro, fish sauce, brown sugar and crushed red pepper in a small bowl.

4. Heat oil in the skillet over medium-high heat. Add beets and cook, stirring, until almost tender, about 4 minutes. Add the ground rice and ½ cup of the sauce. Cook, stirring, until fragrant and the liquid is absorbed, about 2 minutes.

5. To serve, divide the quinoa among 4 bowls and top with the beet larb, cabbage, cucumber, herbs and carrot. Drizzle with the remaining sauce.

SERVES 4 2 cups each

CAL 279 / **FAT** 10G (SAT 1G) / **CHOL** 0MG / **CARBS** 43G / **TOTAL SUGARS** 11G (ADDED 2G) / **PROTEIN** 8G / **FIBER** 7G / **SODIUM** 790MG / **POTASSIUM** 683MG

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SWAP RED BEETS FOR MEAT AND MAKE IT MORE HEARTY AS PART OF A GRAIN BOWL. SPOON BEETS OVER LETTUCE FOR A LIGHTER TAKE.

Give this meal the true steak house treatment and serve it with steamed asparagus, french fries and a big, bold cabernet sauvignon.

Grilled Red Cabbage with Herb Butter

ACTIVE 35 min **TOTAL** 9 hrs (including 8 hrs marinating time)
TO MAKE AHEAD Marinate cabbage (Steps 1 and 2) for up to 1 day. Refrigerate herb butter (Step 3) for up to 1 week or freeze for up to 3 months.

CABBAGE STEAKS

- 2 medium heads red cabbage (about 3 pounds each)
- 2 cloves garlic, minced
- ¼ teaspoon salt
- 1 cup red wine
- ½ cup extra-virgin olive oil
- ¼ cup reduced-sodium tamari
- 2 tablespoons Dijon mustard
- 1 tablespoon chopped fresh rosemary
- 1 tablespoon light brown sugar
- ½ teaspoon ground pepper

HERB BUTTER

- 4 tablespoons unsalted butter, softened
- 2 tablespoons finely chopped fresh herbs, such as basil, dill *and/or* chives
- ¼ teaspoon ground pepper

1. To prepare cabbage: Place each cabbage on a cutting board, stem side up. Using a large chef's knife, cut two 1-inch-thick slices from the center of each head. Reserve the remaining cabbage for another use.

2. Mash garlic and salt with a fork or the side of a chef's knife to form a paste. Combine the garlic paste with wine, oil, tamari, mustard, rosemary, brown sugar and ½ teaspoon pepper in a 9-by-13-inch baking dish. Dip the cabbage slices in the marinade to coat both sides, then place in a large sealable plastic bag. Pour the remaining marinade on top. Refrigerate for at least 8 hours and up to 1 day, turning occasionally.

3. To prepare herb butter: Combine butter, herbs and pepper in a small bowl. Scrape onto a piece of plastic wrap and shape into a 1-by-2-inch cylinder. Roll up in the plastic. Refrigerate.

4. Preheat grill to medium-high and preheat oven to 400°F.

5. Remove the cabbage from the marinade (discard the marinade). Grill, turning occasionally, until very charred, 16 to 20 minutes total. Transfer to a large baking sheet. Bake until tender, about 15 minutes. Serve with the herb butter.

SERVES 4 1 cabbage steak and 1 tablespoon butter each
CAL 314 / **FAT** 23G (SAT 9G) / **CHOL** 31MG / **CARBS** 22G / **TOTAL SUGARS** 11G (ADDED 0G) / **PROTEIN** 5G / **FIBER** 6G / **SODIUM** 450MG / **POTASSIUM** 703MG

Celeriac & Walnut Tacos

ACTIVE 25 min **TOTAL** 25 min

- ½ cup walnuts
- 8 ounces celeriac (celery root), peeled and cut into 1-inch pieces
- 2 tablespoons corn oil
- 1 clove garlic, finely chopped
- 1 teaspoon chili powder
- ¾ teaspoon ground cumin
- ¼ teaspoon crushed red pepper
- ¼ teaspoon salt plus a pinch, divided
- ⅛ teaspoon onion powder
- ⅛ teaspoon dried oregano
- ½ cup water
- ½ cup julienned peeled jicama *and/or* radishes
- 1 tablespoon lime juice
- 8 corn tortillas, warmed
- 1 ripe avocado, sliced
- ½ cup fresh salsa *or* pico de gallo
- ¼ cup fresh cilantro

1. Toast walnuts in a medium skillet over medium heat until fragrant, about 2 minutes. Pulse in a food processor to coarsely chop. Transfer to a small bowl.

2. Pulse celeriac in the food processor until chopped into ¼-inch pieces.

3. Heat oil in the pan over medium heat. Add the celeriac and cook, stirring occasionally, until tender, about 5 minutes. Add the walnuts and garlic and cook, stirring, for 30 seconds. Add chili powder, cumin, crushed red pepper, ¼ teaspoon salt, onion powder and oregano; cook, stirring, for 30 seconds. Add water and simmer until mostly absorbed but still saucy, 1 to 2 minutes. Remove from heat and cover to keep warm.

4. Mix jicama (and/or radishes) with lime juice and the remaining pinch of salt.

5. Serve the celeriac mixture in tortillas topped with the jicama (and/or radishes), avocado, salsa (or pico de gallo) and cilantro.

SERVES 4 2 tacos each

CAL 371 / **FAT** 24G (SAT 3G) / **CHOL** 0MG / **CARBS** 38G / **TOTAL SUGARS** 4G (ADDED 0G) / **PROTEIN** 7G / **FIBER** 9G / **SODIUM** 428MG / **POTASSIUM** 588MG

FAKE OUT YOUR FAMILY AND FRIENDS WITH THIS FAST PLANT-FUELED TACO DINNER. IF YOU WANT SOME HEAT, ADD SOME MINCED JALAPEÑO.

CHAPTER FOUR

Eat More Fiber

This powerful carbohydrate has been linked to everything from blood sugar control and a lower risk of diabetes to weight loss and a longer life. Here's how you can fit more fiber into your food choices.

WHY FIBER

The benefits of this nutrient are many. Herewith, a counting of the ways.

By Shaun Dreisbach

YOU'LL LOSE WEIGHT. This is true even if increasing your fiber intake is the only dietary change you make. Dieters who were told to get at least 30 grams of fiber a day, but given no other dietary parameters, lost a significant amount of weight, according to a recent study in the *Annals of Internal Medicine*. In fact, they lost nearly as much as a group put on a much more complex diet that required limiting calories, fat, sugar and salt and upping fruit, veggie and whole-grain consumption. Fiber-rich foods not only fill you up faster and keep you satisfied longer, they also prevent your body from absorbing some of the calories in the foods you eat. "Fiber binds with fat and sugar molecules as they travel through your digestive tract, which reduces the number of calories you actually get," explains Tanya Zuckerbrot, R.D., author of *The F-Factor Diet*.

YOU'LL MAINTAIN A HEALTHIER WEIGHT OVER TIME. People who get more fiber tend to be leaner overall. Those who were obese got an average of almost one gram a day less fiber than normal-weight participants, according to a four-week study at the Medical University of South Carolina. Research at Georgia State University found that mice put on diets lacking in fiber gained weight and had more body fat compared to those who weren't deficient. Also, mice given adequate soluble fiber resisted fat gain—even when on a high-fat diet.

YOU'LL CUT YOUR RISK FOR TYPE 2 DIABETES. A recent analysis of 19 studies found that people who ate the most fiber—more than 26 grams a day—lowered their odds of the disease by 18 percent, compared to those who consumed the least (less than 19 grams daily). The researchers believe that fiber's one-two punch of keeping blood sugar levels steady and keeping you at a healthy weight may help stave off the development of diabetes.

YOU'LL LOWER YOUR ODDS OF HEART DISEASE. For every seven grams of fiber eaten daily (that's about half an avocado, or a cup of bran flakes), your risk of heart disease drops by 9 percent according to a review of 22 studies published in the *BMJ*. That's partly due to fiber's ability to sop up excess cholesterol in your system and ferry it out before it can clog your arteries.

YOU'LL HAVE A HEALTHIER GUT. The good bugs that make up your microbiome feed off fiber—and flourish. As your gut bacteria gobble up fiber that has fermented in your GI tract (delish), they produce short-chain fatty acids that have a host of benefits—including lowering systemic inflammation, which has been linked to obesity and nearly every major chronic health problem. A recent study conducted in Italy found that eating a high-fiber Mediterranean diet was associated with higher levels of short-chain fatty acids. "And you can start to see the changes in gut bacteria within just a few days," says Kelly Swanson, Ph.D., a professor of nutritional sciences at the University of Illinois at Urbana-Champaign. The catch: You've got to consistently get enough grams—ideally every day, if not most days of the week—to keep getting the benefits.

YOU'LL REDUCE YOUR RISK OF CERTAIN CANCERS. Every 10 grams of fiber you eat is associated with a 10 percent reduced risk of colorectal cancer and a 5 percent fall in breast cancer risk, according to a study published in the *Annals of Oncology*. In addition to the anticancer effects of fiber, the foods that contain it—like vegetables and fruits—are also rich in antioxidants and phytochemicals, which could further reduce your odds.

YOU'LL LIVE LONGER, PERIOD. Researchers at the Harvard School of Public Health recently found that people who often ate fiber-rich cereals and whole grains had a 19 percent and 17 percent, respectively, reduced risk of premature death—from any cause—compared to those who noshed on less fiber-heavy fare.

YOU'LL BE MORE REGULAR. Snicker all you like, but "constipation is one of the most common GI complaints in the United States," says Zuckerbrot. And you don't need us to tell you it's no fun. Fiber makes your poop softer and bulkier—both of which speed its passage from your body.

YOU'LL GET AN ALL-NATURAL DETOX. Who needs a juice cleanse? Fiber scrubs and promotes the elimination of toxins from the GI tract. Explains Zuckerbrot: "Soluble fiber soaks up potentially harmful compounds, such as excess estrogen and unhealthy fats, before they can be absorbed by the body." And, she adds, because insoluble fiber makes things move along more quickly, it limits the time that chemicals like BPA, mercury and pesticides stay in your system. The faster they go through you, the less chance they have to cause harm.

YOU'LL HAVE HEALTHIER BONES. The types of fiber found in asparagus, leeks, soybeans, wheat and oats have been shown to increase the availability of minerals like calcium in foods, which may help with bone density. ●

Raspberries
8 GRAMS PER CUP

A HILL OF BEANS

Both hearty and delicious, these tiny morsels pack a powerful fiber punch.

IN SOUPS, WITH RICE OR EVEN BY THEMSELVES, beans are not only tasty and functional, they are also versatile superfoods packed with fiber. One cup of black beans contains 15 grams, more than twice the fiber in a cup of whole wheat spaghetti and more than three times the amount in a cup of oatmeal. From pinto to soy to kidney, beans all pack a similar punch, yet they still have differences—both in flavor and nutritional value.

FRESH OR DRY?

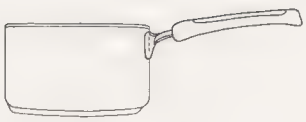
When you buy beans at a farmers' market or a busy store with a lot of turnover, you're likely to be getting fresher beans (harvested in the last year or so). Fresh beans are less dry, so they cook more quickly and evenly, but they can contain a lot of sodium. While dried beans are cheaper and often tastier, simmering can take at least a couple of hours, and they can be harder to find. However, both fresh and dried are fiber-packed.

CHOOSE A BEAN

Most recipes you'll find work with cannellini, pinto or black beans, but those are just a starting point. The choices are countless, and good for you, too. High-fiber, low-calorie chickpeas and kidney beans can lower blood sugar, a key tool for tackling diabetes, and pinto beans can decrease cholesterol.

TO SOAK OR NOT TO SOAK?

Soaking beans helps them to cook more evenly and cuts down on the total cooking time. But while it can make them easier to digest, sometimes soaked beans lose some of their nutrients, such as potassium, iron, folate (vitamin B9) and magnesium. ●



How to Cook a Pot of Beans

Dry beans can scare the savviest of home cooks.

1. Pick over 1 pound dry beans to remove any pebbles or broken beans and rinse well under cold water. Place in a large bowl, cover with 3 inches of cold water and soak for 4 to 24 hours.

2. When you're ready to cook the beans, heat 3 tablespoons extra-virgin olive oil in a large saucepan over medium heat. Add 1 small chopped onion, 2 to 3 chopped garlic cloves and 1 chopped celery stalk (optional). Cook, stirring, until the vegetables are beginning to soften, 3 to 4 minutes. Drain the beans and add to the pan.

Add enough cold water to cover the beans by 1 inch. Bring to a boil and boil for 5 minutes. Lower the heat to a bare simmer, partially cover and cook, stirring occasionally, until tender, 20 minutes to 3 hours, depending on the freshness of the beans.

If at any time the liquid level drops below the beans, add 1 cup hot water. When the beans are nearly soft, stir in 1 to 1½ teaspoons salt. (Do not drain: beans are best stored in their cooking liquid and the liquid can be used in some recipes.)

MAKES about 6 cups

PER ½-CUP SERVING OF PINTO BEANS: **CAL** 125 / **FAT** 1G (SAT 0G, MONO 0G) / **CHOL** 0MG / **CARBS** 23G / **PROTEIN** 8G / **FIBER** 8G / **SODIUM** 57MG / **POTASSIUM** 382MG

THE GOODNESS OF WHOLE GRAINS

If you're looking to boost the fiber in your life, you'll want to make friends with the original "good carbs."

By Joyce Hendley

WHEN YOU OPT FOR WHOLE GRAINS OVER REFINED ones, you are most definitely trading up. Whole grains are a good source of fiber—and for most of us, they're one of the biggest contributors of fiber to our daily diets. And fiber is just the beginning: whole grains also deliver a powerful package of vitamins, minerals and antioxidants that both nourish and satisfy us. They're often a good source of nutrients we sometimes have trouble getting enough of, such as magnesium, selenium and zinc, and supply resistant starch, the kind that helps support a healthy gut microbiome.

Studies show that people who regularly eat whole grains tend to have lower rates of heart disease, high blood pressure, strokes and some types of cancer (particularly colorectal cancer), along with better blood sugar control and lower rates of diabetes.

Whole grains may also play a role in preventing obesity. "Good carb" eaters tend to be leaner, and may even have less belly fat—the type that's associated with higher heart disease risk. How? A recent study from the Jean Mayer USDA Human Nutrition Research Center on Aging (HNRCA) at Tufts University suggests some possible mechanisms. Researchers found that when a group of middle-aged men and women consumed a whole-grain-rich diet for six weeks, they burned more calories daily, and retained fewer calories during digestion, than a similar group that ate a nearly identical diet, but with refined grains. The researchers suggested that the net calorie loss—about 100 calories per day—could add up to a five-pound weight loss over a year.

Bottom line? "Whole grains are carbohydrates we can feel good about eating for health as well as enjoyment," noted lead author Susan B. Roberts,

Ph.D., director of the Energy Metabolism Laboratory at the HNRCA.

Turning to whole grains for fiber is an excellent motivation in itself, but there's so much more to celebrate.

What Makes It Whole?

Grains are the edible seeds of cereal grasses, such as wheat, oats, barley, corn, rice, sorghum, rye, millet and teff. (Other "pseudograins" like amaranth and quinoa don't come from grasses, but we eat them like grains, so they're included here too.) These delicious, varied grains form the backbone of people's diets all around the world, and the benefits of these grains comes down to the seeds.

All seeds are born "whole," with three distinct parts: (1) the bran, which is the seed's fiber- and antioxidant-rich outer skin; (2) the germ, the seed's embryo that can sprout into a new plant, rich in nutrients and healthy fats; and (3) the endosperm, the starchy core, which serves as a food supply for the sprouting seed. It contains mostly starchy carbs and a little protein.

When grains are processed, or refined, to make products such as white bread and cake flour, the bran and germ are removed, leaving just the endosperm. That gives them the finer texture, milder taste and lighter color many consumers are used to and prefer—and it helps extend their shelf life. (This is why many companies that produce in mass quantities prefer them.) But what gets lost in the process? Just about everything good—including about three quarters of the fiber and one half to two thirds of the nutrients.

In the United States it's mandatory, per government regulations, that some refined grains like wheat, rice, cornmeal and pasta be "enriched" with added B vitamins and iron to replace what was lost in processing. (The FDA also requires enriched grain products like bread, pasta, rice, cereal and corn masa flour to be fortified with folic acid, a B vitamin, to help prevent birth defects in the population.)

As healthy as "enrichment" sounds, it's important to remember that only some of the missing nutrients are replaced in the process—and not in the same proportions. For example, enriched wheat flour supplies almost three times as much vitamin B2 (riboflavin) and 129 percent of the iron found in whole wheat—but a little more than half of the selenium, 27 percent of the zinc, and only 8 percent of the vitamin E. Opting for whole grains over refined ones means you're getting all the nutrition nature intended to package in these healthy grains—nothing more, nothing less.

How Much?

The 2015 Dietary Guidelines and the American Heart Association recommend that at least half of the grains you eat daily are whole grains. For adults, depending on calorie needs, that means eating three to five servings of whole grains each day. Seems easy enough, but at last count, more than 90 percent of us didn't make that goal. Taste preferences, lack of availability of whole-grain foods, or confusion about identifying whole grains are just some of the possible reasons.

Meeting the guidelines doesn't take much: a serving of whole grains, sometimes called an "ounce equivalent," provides 16 grams of whole grains—about the amount you'll get in a half cup of cooked oats, brown rice or whole-wheat pasta, or a slice of 100 percent whole-grain bread.

The easiest way to get those three servings is to choose 100 percent whole-grain versions for at least half of the grain foods you eat daily. Have a bowl of old-fashioned oatmeal for breakfast and a sandwich on whole-wheat bread for lunch, and you've met your daily goal without breaking a sweat.

Of course, too much of a good thing can be—well, stomach-churning. As with any fiber-rich food, it's best to add whole grains to your life gradually, to get your digestive tract accustomed to digesting them—especially if you're also trying to fiber up the rest of your diet, too. Start by swapping in one serving

of whole grains a day, and work up gradually until you've met your three-serving goal.

Another caveat: if you opt to get all your grains from whole-grain sources, you'll want to make sure you're getting enough folic acid, since whole-grain products aren't required to be fortified with this B vitamin like refined grain products are. Be sure to eat plenty of greens and other vegetables, fruits, and legumes, which are rich in folate, the naturally occurring form of the vitamin. (You might also find some products, like whole-grain cereals, that have been fortified with folic acid.)

It's no trouble finding whole grains if you choose naturally whole-grain foods that are ready to eat in their original forms, like brown rice, quinoa, wheat berries, popcorn and amaranth. And seeking out minimally processed whole grains, like steel-cut or old-fashioned oats, whole-wheat flour, whole bulgur, or whole-grain cornmeal, is also a safe bet.

When it comes to processed foods made with whole grains, things get trickier. An earthy-looking "seven grain" bread with some whole grains sprinkled on top might be made with mostly refined flour and a little brown coloring. Ditto a "multigrain" cracker. In fact, terms like "100% wheat," "enriched flour," "bran" or "stone ground" don't mean much when it comes to identifying whole grains.

The label can give you important clues—especially if it sports a "Whole Grain Stamp" from the Whole Grains Council, a nonprofit consumer advocacy group. The three different stamps give you an instant whole-grain tally: the "100% Whole Grain" stamp indicates all the grains in the product are whole, and you'll get a full serving of whole grains (16 grams) in each serving; the "50% Whole Grain" stamp indicates that at least half of the grains are whole, and you'll get a half serving (eight grams) of whole grains in a serving; a plain "Whole Grain" stamp means that you'll get at least a half serving of whole grains (eight grams) in a serving, but the product contains mostly refined grains.

If there's no Whole Grain Stamp, check the ingredients list. If a grain with "whole" in its name comes first or second on the list—like whole-wheat flour, oats, whole cornmeal or whole durum flour (a high-protein wheat used for pasta)—you can feel pretty confident you're getting the whole-grain goods. ●

Four Whole-Grain Superstars

Any whole grain is full of good stuff, but some whole grains stand out for their nutritional value—and their great taste.

AMARANTH

This ancient grain is finding its way to more tables these days, with good reason: the tiny kernels have a good amount of high-quality protein and calcium, as well as cholesterol-fighting phytosterols. Try amaranth in a pilaf or porridge—or pop it like popcorn.

BARLEY

Got fiber? Barley sure does. At 4.8 grams per serving (one ounce dry or a half cup cooked) it's the highest-fiber whole grain, and much of that is beta-glucan, a soluble fiber that helps lower "bad" LDL cholesterol and smooth blood sugar levels. It also has a fair amount of protein, and antioxidant selenium. Choose hull-less (rather than pearled or quick) barley for the biggest nutrient punch.

OATS

Like barley, oats are rich in fiber (about three grams per serving) and heart-healthy beta-glucan—and deliver a good dose of protein (five grams). But they're also blessed with antioxidant polyphenols that help fight inflammation (one reason why oatmeal baths soothe itchy skin). Look for steel-cut, old-fashioned or quick oats for optimal nutrition.

QUINOA

Not technically a grain, this nutty "pseudograin" is a protein powerhouse, with four grams of high-quality protein per serving (slightly less than what is in a small egg). Quinoa also supplies iron, along with bone-building magnesium and phosphorus.

Fiber Redux

Barley Salad with Sugar Snap Peas, Baby Bok Choy & Green Romesco Dressing

(Shown top)

ACTIVE 55 min **TOTAL** 55 min
TO MAKE AHEAD Refrigerate romesco (Step 3) for up to 1 day.

For this veggie-packed grain salad you can use most types of barley—hulled, pearled (which will cook the quickest) or the so-called hull-less type developed by the Culinary Breeding Network. Find hull-less from Bob's Red Mill.

- 2 cups water
- ¾ cup hull-less *or* hulled barley
- 5 poblano peppers (about 1 pound total)
- ½ cup extra-virgin olive oil, divided
- 6 tablespoons slivered almonds, toasted
- ¼ cup sherry vinegar
- 2 teaspoons honey
- 1 small clove garlic
- 1 teaspoon kosher salt
- ½ teaspoon hot paprika
- ½ teaspoon ground pepper
- 4 small baby bok choy (about 12 ounces total), halved lengthwise
- 3 cups sugar snap peas, trimmed
- ½ cup thinly sliced red onion
- ⅓ cup lightly packed fresh mint, thinly sliced
- 5 small radishes, trimmed and thinly sliced

1. Combine water and barley in a heavy medium saucepan. Bring to a boil. Reduce heat, cover and simmer until tender and most of the liquid has been absorbed, 40 to 50 minutes. Drain, if necessary, and transfer to a large bowl.

2. Meanwhile, position rack in upper third of oven; preheat broiler to high.

3. Broil peppers on a baking sheet, turning occasionally, until blackened and blistered, 8 to 12 minutes total. Transfer to a large bowl, cover with plastic wrap and let steam for 10 minutes. Remove and discard skins, cores and seeds. Transfer the peppers to a food processor. Add 7 tablespoons oil, almonds, vinegar, honey, garlic, salt, paprika and pepper; process until pureed.

4. Place bok choy on the baking sheet, cut side up. Brush with the remaining 1 tablespoon oil. Broil until starting to brown in spots, 5 to 8 minutes. Add to the barley, along with peas, onion, mint and the romesco sauce; stir to combine. Arrange on a platter and serve topped with radishes.

SERVES 8 1 cup each
CAL 256 / **FAT** 17G (SAT 2G) / **CHOL** 0MG / **CARBS** 22G / **TOTAL SUGARS** 5G (ADDED 1G) / **PROTEIN** 5G / **FIBER** 6G / **SODIUM** 263MG / **POTASSIUM** 362MG

Bean Salad with Charred Lemons

(Shown bottom)

ACTIVE 15 min **TOTAL** 30 min

- 1 lemon, halved and very thinly sliced
- 7 tablespoons extra-virgin olive oil, divided
- 3 tablespoons lemon juice
- 2 teaspoons sugar
- ¾ teaspoon kosher salt
- ¼ teaspoon ground pepper
- 3 cups mixed cooked beans
- ¾ cup crumbled feta cheese
- 1 ripe avocado, thinly sliced
- 8 cups Bibb *or* butter lettuce, torn if large

1. Preheat oven to 375°F. Line a baking sheet with parchment paper.

2. Place lemon slices on the baking sheet. Drizzle with 1 tablespoon oil. Roast until golden brown and crisp in spots, about 20 minutes.

3. Meanwhile, whisk the remaining oil, lemon juice, sugar, salt and pepper in a large bowl. Add beans, feta and avocado. Toss to combine.

4. Just before serving, add lettuce and toss to coat. Top with the lemons and serve immediately.

SERVES 8 1 cup each
CAL 280 / **FAT** 20G (SAT 4G) / **CHOL** 13MG / **CARBS** 19G / **TOTAL SUGARS** 3G (ADDED 1G) / **PROTEIN** 9G / **FIBER** 8G / **SODIUM** 367MG / **POTASSIUM** 508MG

Farro Salad with Cranberries & Persimmons

ACTIVE 25 min **TOTAL** 45 min
TO MAKE AHEAD Prepare through Step 2 and let stand at room temperature for up to 1 hour or refrigerate for up to 1 day. Finish with Step 3 just before serving.

There are two types of persimmons and they are not interchangeable. The flat-bottomed Fuyus called for here are bright orange and the texture of an almost-ripe peach when ready to eat—perfect for salsas and salads, with or without the peel. Oval-shaped, darker orange and larger Hachiyas are only edible when almost liquid on the inside. The flesh is best used in baking or can be scooped out of the skin and eaten like custard. Underripe, they are off-puttingly tart.

- 4 cups water
- 2 cups pearled farro
- ½ cup halved and thinly sliced red onion
- ¼ cup lime juice
- 2 tablespoons sherry vinegar
- ¾ teaspoon kosher salt
- 1 pound Fuyu persimmons *or* firm ripe mangoes *or* apples, chopped
- ½ cup dried cranberries
- ¼ cup extra-virgin olive oil
- 4 cups baby arugula
- Freshly ground pepper to taste

1. Combine water and farro in a medium saucepan and bring to a boil. Reduce heat to maintain a simmer, cover and cook until the farro is just tender, 20 to 25 minutes. Drain and rinse with cold water. Drain again.

2. Combine onion with lime juice, vinegar and salt in a large bowl. Let stand 5 minutes. Stir in persimmons (or mangoes or apples), cranberries, oil and the farro.

3. Just before serving, fold in arugula. Transfer the salad to a serving platter or bowl and garnish with pepper.

SERVES 12 ¾ cup each
CAL 218 / **FAT** 6G (SAT 1G) / **CHOL** 0MG / **CARBS** 40G / **TOTAL SUGARS** 7G (ADDED 4G) / **PROTEIN** 4G / **FIBER** 3G / **SODIUM** 125MG / **POTASSIUM** 138MG

Farro is also great in hearty Italian soups or in place of Arborio rice in a riff on a risotto.

Beef Kofta with Bulgur & Kale Salad

ACTIVE 40 min **TOTAL** 50 min
TO MAKE AHEAD Refrigerate bulgur (Step 1) for up to 3 days.
Whole grains take too long to cook, you say? Well, say hello to bulgur, which can be ready in less than 15 minutes.

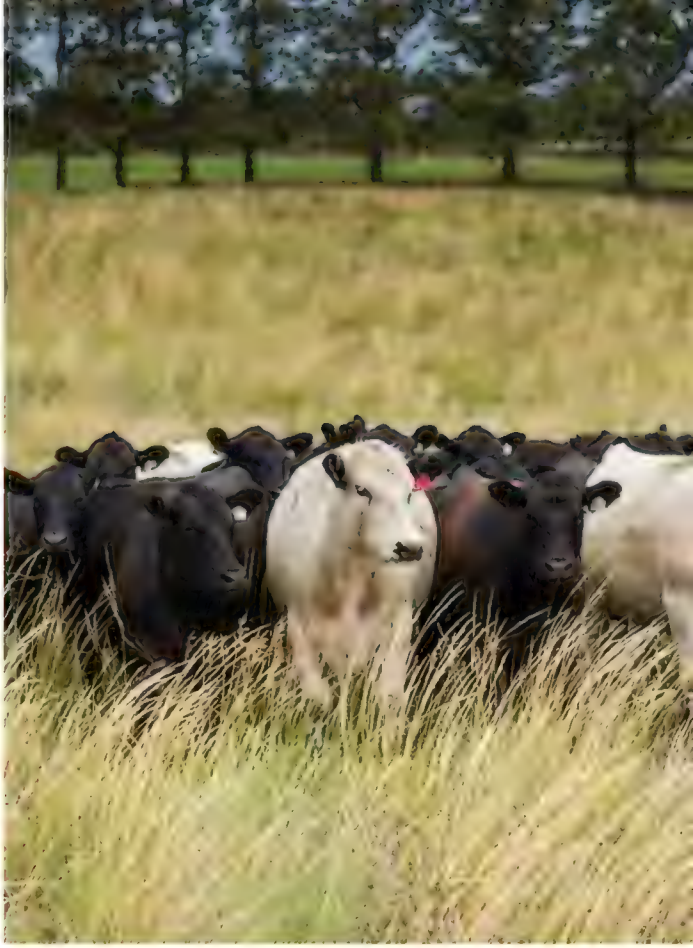
- **2 cups water**
- **1 cup bulgur**
- **1 pound ground beef**
- **½ cup finely chopped red onion plus ¼ cup slivered, divided**
- **2 medium cloves garlic, grated**
- **2 teaspoons ground cumin**
- **¾ teaspoon salt, divided**
- **½ teaspoon ground pepper, divided**
- **4 cups packed chopped kale**
- **1 cup halved cherry tomatoes**
- **3 tablespoons crumbled feta cheese**
- **2½ tablespoons extra-virgin olive oil**
- **2 tablespoons red-wine vinegar**
- **½ teaspoon dried oregano**

1. Bring water and bulgur to a boil in a medium saucepan. Cover, reduce heat to maintain a simmer and cook until tender, about 12 minutes. Drain any excess liquid. Spread on a rimmed baking sheet to cool for 10 minutes.
2. Position rack in upper third of oven. Preheat broiler to high.
3. Transfer 1 cup of the bulgur to a medium bowl. Add beef, chopped onion, garlic, cumin, ½ teaspoon salt and ¼ teaspoon pepper to the bowl; gently knead together until just combined. (Do not overmix.) With damp hands, form the mixture into 8 cigar-shaped patties, 4 inches long and 1½ inches thick. Transfer the remaining bulgur to a large bowl.
4. Coat the baking sheet with cooking spray and place the kofta patties on it. Broil, turning once, until an instant-read thermometer registers 160°F, 10 to 12 minutes total.
5. Meanwhile, add kale, tomatoes, feta, oil, vinegar, oregano, the slivered onion and the remaining ¼ teaspoon each salt and pepper to the bulgur; gently toss to combine. Serve with the kofta.
SERVES 4 2 kofta and 1¼ cups salad each
CAL 450 / **FAT** 23G (SAT 7G) / **CHOL** 80MG / **CARBS** 33G / **TOTAL SUGARS** 3G (ADDED 0G) / **PROTEIN** 30G / **FIBER** 6G / **SODIUM** 596MG / **POTASSIUM** 734MG

CHAPTER FIVE

Meat and Fish: Choose Right

Small steps in the kitchen can make you healthier and lead to meaningful environmental change. Here's why to source smarter, and how to celebrate sustainable seafood and meat at mealtime.



THE SUSTAINABLE TABLE

The seafood we eat has an enormous impact on our health today and on the health of our oceans tomorrow. A leading scientist makes a case for changing our tastes.

By Carl Safina

IT'S A LATE NOVEMBER WEEKEND, SOME YEARS ago, and I steer my boat, *First Light,* out of the harbor, knowing this will be my last fishing trip of the year. It's become a tradition. What my partner, Patricia, and I seek will provide reason enough to give abundant thanks.

Off the very tip of Long Island, New York, migrating ducks and loons enliven the sea's wintery surface. Already a few seals from the north are appearing. Gannets on long wings have come from coastal Canada following the same prey that we are after today, and we watch the birds carefully. When I see them raining into the sea like white missiles, I turn the wheel toward them.

They're all here for the same reason I am: the strong currents keep this place awash in plankton, enriching the whole food chain, concentrating wildlife of all kinds.

As soon as I drop a line, I will become part of this complex web of interdependence—that's what I most love about being here.

Today, though, the fish we pursue are different from what you might expect or what I would have sought several years ago. I've fished these waters since I was a teenager in the 1970s, and I've seen the ocean change. The big offshore fish—the swordfish and sharks I once thrilled to see, catch and eat—are now so scarce I just don't feel good about hooking them anymore. U.S. fishermen now often catch less than 20 percent of the bluefin tuna they're allowed because they can't find enough to fill their quotas. Hammerhead sharks—common when I started fishing offshore in the 1980s—are down about 90 percent, and other shark populations are severely depleted too.

The dominoes often fall in unpredictable ways,

upsetting the natural balance. As sharks off the East Coast have been fished down to low levels, the stingrays they used to eat have proliferated. So much so that the rays now demolish shellfish beds, putting some clammers out of business.

In the North Atlantic, commercially important fish like cod and halibut declined by two thirds between 1950 and 2000. Atlantic cod had been a source of riches for 500 years, but in the early 1990s Canada's cod fishery "collapsed" (declined more than 90 percent) due to overfishing, bringing long-term devastation to communities up and down the seaboard. Cod levels are slowly returning. As of June 2017, cod around Canada had returned to 25 percent of the levels seen in the 1980s.

In 2006, an international team of scientists analyzing global fisheries data wrote in *Science* magazine, "Accelerating loss of populations and species . . . is increasingly impairing the ocean's capacity to provide food, maintain water quality, and recover." They found that since 1950 about a third of all fished species worldwide have collapsed. They also noted that, at current rates, the rest would collapse by 2050.

If a whole fish is small enough to fit on your dinner plate, it's probably a good choice for both the environment and your own health.

Of all the things that are changing the ocean—including pollution, climate change and coastal development—fishing has brought the most profound change so far.

I've often said fishing is the last buffalo hunt—the last wild food we hunt and consume en masse. And it's worth recalling the cautionary tale of North America's most abundant bird, the passenger pigeon. In 1810, the pioneering ornithologist Alexander Wilson estimated one "almost inconceivable multitude" of pigeons as being roughly 240 miles long, containing 2.2 billion birds. After a century of being hunted for food, the last passenger pigeon on earth died in the Cincinnati Zoo in 1914.

Though "there are plenty of fish in the sea"—or were—abundance doesn't make them immune to overexploitation. Yet the same researchers who warned of a total fisheries collapse before 2050 added that "at this point, these trends are still reversible" if we improve management and declare ample no-fishing zones where fish are able to reproduce. The buffalo herds are gone and the passenger pigeon has passed—but there remains hope for the ocean.

Will It Work?

It has before. In the late 1990s, when Atlantic swordfish reached an all-time low, environmental groups and high-profile chefs began working together to promote a ban on eating swordfish. They reduced demand enough to soften the price and bring commercial fishing groups to the bargaining table. Environmental groups also won a lawsuit to close fishing areas where juvenile swordfish congregate. The population is rebounding and may soon be sustainable again.

Around that same time, a conservation magazine asked me to create a list that evaluated popular seafood from most sustainable to least. Before that, a piece of fish was simply a piece of fish. You didn't think about it, you just ate it, like a piece of bread. Today that database has grown and spawned various regional sublists, making it easier for consumers to make the right choices.

And America's fisheries have gotten better, realizing that their own future livelihood is at stake. Though they still have problems, they also have some of the better management rules in the world. U.S. fisheries must now be evaluated biannually, and since 2006 federal fishery managers have been required to establish annual catch limits that allow depleted populations to begin rebuilding. Alaska, the state with the highest seafood landings, has perhaps the best-managed fisheries in the world, with tight quotas, strict environmental regulations and close monitoring so that fisheries are closed before they exceed critical limits.

The Simplest, Healthiest Solution

When people ask me now what fish to eat, I pause. The answers can seem confusing: Atlantic cod is not sustainable but Pacific cod is. Alaskan salmon is fine. Most farmed salmon—even organic—is not, as many salmon farms are infecting and threatening the wild species. Most domestic shrimp is farmed sustainably or caught in ways that limit the incidental

capture of unwanted fish or sea turtles. Much of the shrimp from overseas is not.

So my new rule of thumb is very, very simple: if a whole fish is small enough to fit on your dinner plate, it's probably a good choice for both the environment and your own health.

Here's why: smaller fish that are lower on the food chain tend to be abundant, fast-reproducing and more resilient to fishing pressure. Bigger fish usually live longer, taking years to mature and begin breeding. Because they're near the apex of the food chain, there are fewer of them to begin with. So they're much more vulnerable to overfishing and are easily depleted. And slow-growing, long-lived, late-maturing fish like sharks and big tuna can't just bounce back. Rebuilding will take time. And so far, we're not giving them much of a chance.

Consequently, though I used to love grilled mako steaks, I won't kill sharks anymore; it's not good for them, and, just as important, eating them is not good for me. Simply put, big, older fish accumulate more mercury than small and younger ones.

Most of the mercury people acquire gets into the environment from burning coal, but we usually get it into our bodies through eating seafood. Most animals we eat are killed when they are young (six weeks for a chicken) and have not accumulated that much mercury. By contrast, the large bluefin tuna we catch are 10 years old. Contaminants like mercury, pesticides, PCBs and other metals and toxic chemicals aren't just passed along in the food chain; they accumulate and concentrate toward the top. Think of the ocean food chain as a simple pyramid, with, say, a shark at the top, a large number of herring in the middle and a vast horde of planktonic plants and animals at the base. (In real life, it's more complicated, of course, with more steps.) The plant plankton absorb minute quantities of contaminants as they turn nonliving components of seawater into living cells. Think of the total of all the contaminants in all the plankton along the pyramid's base, and imagine it all concentrating into fewer herring and ultimately in the one big old shark. Basically, that's what happens.

The higher on the pyramid you eat, the more likely you'll be getting a larger portion of concentrated contaminants. Dining on plankton-eating herring is better than eating the shark that ate all those herring. Herring, anchovies, Atlantic mackerel, clams and oysters (small plankton-eaters) have among the lowest mercury concentrations; sharks and tuna (big fish-eaters) have among the highest. And even with farmed fish, smaller is better. Big, carnivorous fish must be fed smaller fish that have been caught in the ocean. Many of those nutrient-rich smaller fish that are turned into fish meal—like herring and sardines—are healthy for people and would be better used as human food.

But what if everyone ate herring and sardines; wouldn't that further skew the food web? You'd think so, but not if we were to eat these nutrient-rich fish in place of some of the meats we currently consume. Consider this: right now, about a third of the world catch of those fish is fed to farmed fish, pigs and chickens. This is a great waste of potential human food, because up to five pounds of fish—edible, nutritious, delicious wild fish—must be fed to the farmed livestock in order to produce one pound of meat.

So, farmed freshwater fish that can be fed a vegetable-based diet, like tilapia or catfish, are better choices than large carnivorous fish. Better yet are farmed clams, oysters and mussels, which require no feeding and actually filter the waters around them (that's how they eat), helping improve water

quality and helping prevent plankton from overproducing and then crashing, which can devastate oxygen availability and kill many other creatures.

Catch of the Day

By the time I reach the diving birds, on this late November day on the water, the sonar on board shows dots representing schools of fish near the bottom in 50 feet of water. Patricia and I have two fishing rods, each rigged with a row of six tiny lures the length of my thumbnail. Here in the same ocean where I've decked big tuna and battled bruising sharks and fought 40-pound striped bass, this is decidedly—and deliciously—small game fishing.

Our sinkers mail the rigs to the bottom. I feel a bump and my rod tip dips, dips more, then more. Pat's already reeling up. And we've struck silver, all right. Into view come the wiggling, shimmering shapes we're looking for. I lift six herring, each about 10 inches long, over the side and into the cooler. Patricia has four herring and two mackerel about the same size. At this rate, it doesn't take long to get about five dozen before we hang up our rigs and head for the dock.

We'll smoke some of these, cook some fresh, and fillet and pickle most of them. They'll show up on our dinner table and as snacks and in gift jars. For weeks they'll give us good food and a good story. ●

Carl Safina, a marine biologist, is the founder of the Blue Ocean Institute. He is the author of Song for the Blue Ocean, *and a winner of the Pew Fellowship in Marine Conservation Award, the MacArthur Fellowship and the Lannan Literary Award.*

Six Fish to Buy

To make this list, fish must (a) have low levels of contaminants—below 216 parts per billion, (b) be high in omega-3s, and (c) come from a sustainable fishery.

Albacore Tuna
Many tuna are high in mercury, but albacore tuna—the kind of white tuna that's commonly canned—is good to buy as long as it is "troll- or pole-caught" in the U.S. or British Columbia.

Mussels and Oysters
Farmed mussels and oysters are good for you. (A three-ounce serving of mussels contains 700 milligrams of omega-3s, and oysters pack 44 percent of the recommended daily value of iron.) Better yet, they are actually good for the environment. Both feed off the natural nutrients and algae in the water, which improves water quality. They can also act as natural reefs, attracting and providing food for other fish. One caveat: raw shellfish, especially those from warm waters, may contain bacteria that can cause illnesses.

Pink Shrimp
Most shrimp are plentiful and reproduce quickly. But whether they are sustainably farmed and harvested is the big question. The best choices are wild-caught MSC-certified pink shrimp (a.k.a. cocktail shrimp) from Oregon or their larger sisters, spot prawns, also from the Pacific Northwest, which are caught by traps to prevent ocean floors from being scraped clean by dragging. Avoid imported shrimp, farmed or wild.

Rainbow Trout
Though lake trout are high in contaminants, nearly all the trout you will find in the market is rainbow trout. In the U.S., rainbow trout are farmed primarily in freshwater ponds and "raceways" where they are more protected from contaminants and fed a fish meal diet that has been fine-tuned to conserve resources.

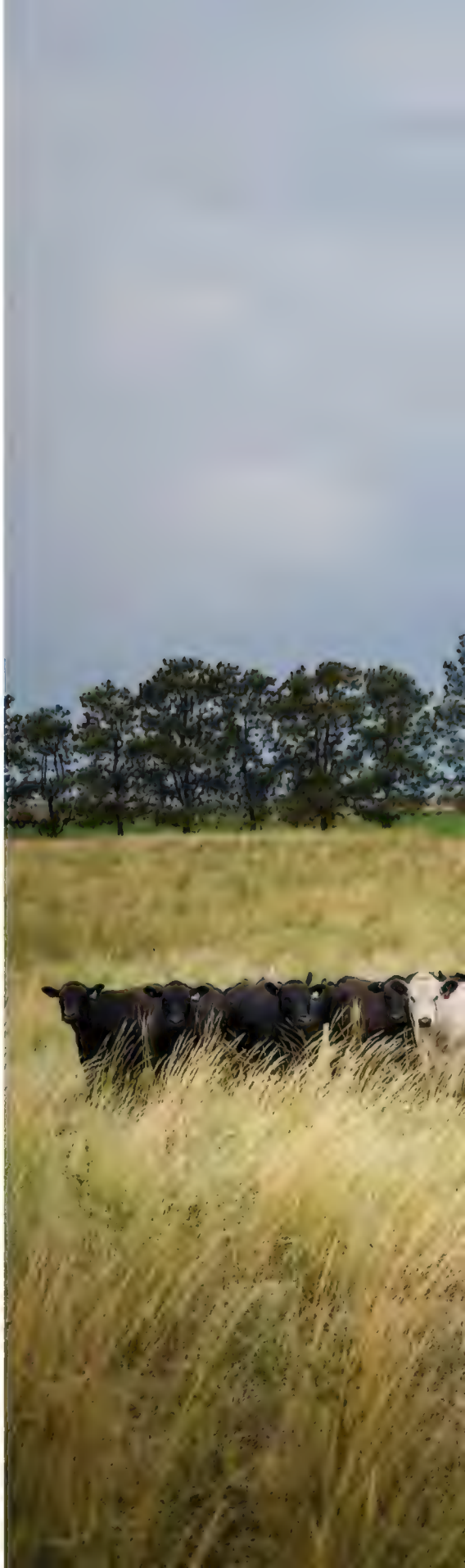
Salmon
Thanks to close monitoring, strict quotas and careful management of water quality, Alaska's wild-caught salmon are both healthier (they pack 950 milligrams of omega-3s and carry few contaminants) and more sustainable than just about any other salmon fishery. But fish farming, when done sustainably (such as setting farms in the open ocean instead of confined to the shore), can have less environmental impact.

Sardines
The tiny, inexpensive sardine is making it onto many lists of superfoods, and for good reason. It packs more omega-3s per three-ounce serving than salmon, tuna or just about any other food.

BEYOND GRASS-FED

Allan Savory, with his controversial method of agriculture, wants to provide a better-raised piece of beef.

By Barry Estabrook



SPENCER AND ABBEY SMITH COULD NOT HAVE picked a less promising year to take over Springs Ranch, a 1,800-acre property in far northeastern California previously run by Spencer's parents. At the best of times, the Surprise Valley, where the ranch is located, is a parched high desert, receiving a meager 16 inches of precipitation a year, virtually all of which falls in the late fall and winter. The young couple began managing the ranch in 2014, during the height of California's recent drought. To add to their difficulties, they would somehow have to expand the existing cattle herd to generate enough money to make the ranch profitable.

I visited Springs Ranch three years later. As we took a walk across the land, my reaction was, "Desert? What desert?" Pastures descended in green waves to the shores of Upper Alkali Lake. The jagged, dun-colored peaks of Nevada's Hays

Of the 30 million cattle brought to market each year, 97 percent are conventionally raised. Less than 1 percent are completely grass fed.

Mountains rose majestically from the opposite bank. Spencer, who sported a straw cowboy hat and wore a pearl-buttoned long-sleeved shirt, jeans and scuffed work boots, pointed to a knoll that was covered in chest-high grass. "That was all bare ground two years ago," he said.

We reached the border between the Smiths' land and their neighbors'. It was obvious where one ranch ended and the other began. The Smith ranch was lush. On the other side of the fence, stands of scraggly, inedible water hemlock predominated. "Some of our neighbors still think we're nuts," Spencer said. "But people are beginning to notice. They can see the fence lines. They can see that we are running more animals."

The Smiths are among a growing number of farmers who passionately advocate regenerative agriculture, a new method of raising animals made famous by Allan Savory, who has launched a global network of farms employing his techniques. They believe that to farm sustainably is no longer enough. Instead, farmers have a duty to go further, by steadily improving their land with the goal of bringing it closer to what was there before the advent of modern agriculture, a time when lush prairies covered much of the central United States. The grasses provided food for vast herds of bison and other herbivores that, in turn, fertilized the soil—a symbiotic relationship that promoted the regrowth of vegetation, improved nutrient content and allowed the ground to hold more moisture. Regenerative agriculture attempts to mimic these conditions with livestock such as cattle, sheep and goats.

If advocates of regenerative farming are right, eating meat—the right meat—may be one of the best things you can do for the environment.

In an era of global warming, Savory and his followers believe this method has a critical role to play that goes beyond putting meat on our plates. Regeneratively managed soil can trap and store vast amounts of carbon that would otherwise remain in the atmosphere as carbon dioxide, a potent greenhouse gas. Exactly how much is still a matter of debate, but one study conducted by the United States Department of Agriculture showed that areas covered by perennial grasses could store more than 20 metric tons of carbon per hectare (about 2.3 acres). Buried carbon is needed to offset the depletion caused by modern industrial farming techniques, which have caused the world's soils to lose between 50 percent and 70 percent of the carbon they once held. Getting carbon back underground has the potential to slow down, and even reverse, climate change. If advocates of regenerative farming are right, eating meat—the right meat—may be one of the best things you can do for the environment.

This notion, to put it mildly, runs contrary to the message that has been drummed into our heads for over a decade. The United Nations Food and Agriculture Organization and other experts maintain that meat production is a major contributor to global warming; refraining from eating it is one simple way we can all reduce our carbon footprints. But the studies that initially led to that conclusion lump all beef production together. In fact, there are dramatically different ways to produce beef. Virtually all cows spend their early lives eating grasses and other forage on open pasture. But after about a year, most of them—97 percent in the United States—get trucked to large, centralized feedlots where they are fattened with grain (also trucked to the feedlots) before slaughter. This system of finishing cows at feedlots is energy intensive and produces high carbon emissions. But a small percentage of cattle spend their entire lives grazing on pasture. Advocates say that this method of "grass fed" beef production has a much lighter environmental footprint. Done regeneratively (using techniques that extend beyond simply having livestock raised on grass), they believe ranching can actually remove more greenhouses gases like carbon and methane than it produces.

The Pioneer of Regenerative Agriculture

No one has had more influence on the development of regenerative farming than Allan Savory, the provocative 85-year-old president and founder of the Savory Institute, a Boulder, Colorado, nonprofit that supports the restoration of grasslands across the globe. Savory's career as a rangeland consultant has taken him to every continent except Antarctica. By his own account, he has trained between

Savory's farming practices helped Brown's Ranch in Bismarck, North Dakota (shown here), increase cattle numbers fivefold, while also improving soil health and crop yields.

10,000 and 15,000 ranchers whose livestock graze on nearly 40 million acres of pasture around the world. He calls his method of regenerative agriculture "holistic management and planned grazing."

Conventional livestock farmers often allow their animals to roam at will over an entire pasture. To prevent overgrazing, range-management experts advise limiting the number of cattle on the land or, alternatively, rotating the animals from paddock to paddock according to an arbitrary timetable. Savory says that both methods are wrong: "We've had about a hundred years of 'range science.' I hate that term because it's not science, it's range beliefs that assume scientific proportion. They come up with rotational grazing and other approaches on and on endlessly, and those have turned pastures into deserts."

Instead, he says, ruminants (any animal that feeds on grass) should be kept in tight herds in small sections of pasture and moved frequently—as soon as the forage has been lightly clipped but not destroyed. Timing is critical. After being browsed by the animals, the plants draw on nutrients stored in their roots to regrow leaves, and that new foliage provides energy that allows the plants to replenish their root systems. Overgrazing occurs if livestock feed again before this cycle runs its course, which can happen even with traditional rotational practices. The root systems weaken, eventually causing the plants to die. In regenerative grazing, animals return to an area only after the vegetation has fully recovered.

This practice has played a crucial role in Spencer and Abbey Smith's success. Under Spencer's father's traditional management, Springs Ranch had been divided into eight pastures. Now, there are

Spencer Smith on a pasture on his California ranch. A few years ago, these fields were parched and far less vigorous, but they rebounded quickly under regenerative management.

24 on the same acreage and those are divided into smaller sub-pastures. Cows used to spend two to three weeks in each paddock. Today, they spend only a day or two on a patch of land before Spencer rides out on his horse to move them.

Savory says his theory of livestock management replicates—and aims to restore—an ancient cycle. The original vegetation of the world's grasslands coevolved with enormous herds of Cape buffalo, elephants, bison and other large grazers. These animals stayed in compact herds to protect themselves against predators and moved often to find grass unsullied by their urine and dung. Because they grazed for only a short time in any area, the forage plants rebounded rapidly, fertilized and watered by the animals' excrement. Their hooves trampled desiccated and inedible plants, thus increasing sunlight and nutrients for "good" vegetation and breaking up hard soil crusts, creating conditions conducive to water infiltration and seed germination. The crushed leaves and stalks from less desirable plants provided natural mulch that retained soil moisture and prevented runoff during rainstorms. The livestock's excrement added nutrients to the soil and further improved its ability to retain water. In turn, better soil produced bigger and thicker grasses that could support more animals. Better soil also harbored more carbon.

On the most rudimentary level, plants are natural pumps that suck carbon out of the atmosphere and bury it safely in the earth—a process called carbon sequestration. Through photosynthesis, plants convert carbon dioxide in the air into carbon compounds that they use as food to grow their leaves and root systems. They also "share" carbon with beneficial fungi living on their roots. These fungi

can trap that carbon deep underground—and keep it there—for thousands of years. Soil-dwelling bacteria that draw their energy by consuming methane also thrive in such environments, reducing the amount of that greenhouse gas (which is emitted as burps and farts by cattle, a major contributor of methane) in the atmosphere.

Savory insists that raising livestock is the only practical way to combat environmental destruction and global warming. "Humans have no ability to sequester atmospheric gases in the soils without livestock," he says. "We have only one option if we are serious about climate change. It cannot be done with current technology—nor any technology we can imagine. We have to change the public attitude from vilifying livestock to vilifying the current reductionist livestock-management practices."

Debating the Savory Approach

On assignments from the USDA in the early 1980s, Savory provided training on regenerative practices to more than 2,000 federal employees over a two-year span. But his iconoclastic theories were so counter to the prevailing beliefs that his contract was canceled. "Since Galileo, it has been the fate of every scientist who discovered something that involved a major shift in scientific belief to be shunned or considered insane," he says. "Thankfully, I was already insane and had survived years of official, expert opposition."

A recent report by the Food Climate Research Network at the University of Oxford found that while grazing animals do have the potential to help with carbon sequestration, they only offset between 20 percent to 60 percent of the greenhouse gas emissions that the grass-fed system produces. "There may be lots of benefits of grass-fed over industrial production, but there's this idea that animals nibble away and magically all of that carbon gets sequestered," says Tara Garnett, Ph.D., one of the lead study authors. "We found that there is a mechanism through which grazing management could potentially lead to sequestration of carbon, but there are so many pitfalls and caveats. In areas where land is degraded, for example, the soil is like a thirsty sponge—and in those types of circumstances you might get a benefit." But already healthy soil, she adds, doesn't have the capacity to store much more carbon before it reaches a saturation point.

There is, however, other research that confirms Savory's theories. Jay Martin, Ph.D., a professor of agricultural and biological engineering at Ohio State University, and a team of scientists compared 18 conventional ranches and seven regeneratively managed cattle operations in Chiapas, a state in southern Mexico that receives very little rainfall for much of the year. They found that regenerative farms could accommodate more cattle per acre, had lower cow and calf mortality, purchased less feed and used fewer herbicides than their conventional neighbors. The researchers also noted that topsoil on regeneratively managed land was deeper, more aerated and densely covered with plants.

The Smiths are now actively educating other ranchers in their region about the benefits of regenerative agriculture. Abbey works remotely for the Savory Institute, and their ranch has become what the organization calls a hub, a demonstration farm and learning center.

Although Savory himself has stepped away from day-to-day operations of the institute that bears his name, he says that one of his proudest accomplishments is the enthusiastic younger team that will carry on his work. The plan is for the Savory Institute to shift into consulting and education. To that end, more than 30 hubs have been established in a few dozen countries, and the institute is on track to have 100 hubs in 32 countries by 2025. "We need something to bring about rapid change," says Savory. "If we wait too long, we're screwed. It's the coming generation that I worry about."

Several years ago, in a conversation with Savory, James Teer, Ph.D., the late distinguished professor of wildlife and fisheries sciences at Texas A&M University, offered an assessment of Savory's life work that no one would dispute: "Allan, either you are wrong and we will not be able to dig a hole deep enough to bury you in, or you are right and we will not be able to build a monument high enough."

Savory gives the impression that he couldn't care less either way. Success stories, like the one unfolding at Springs Ranch, repeated on farms across the world are validation enough. ●

Barry Estabrook is a three-time James Beard Award–winning journalist.

BUYER'S HANDBOOK

This guide can help you source sustainable meat and eggs, an important part of making your home more eco-friendly, while keeping you and your family healthy.

AMERICANS SPEND A LOT OF MONEY IN THE MEAT aisle. Recent data from the USDA showed that American shoppers, across all incomes, spent more than 20 percent of their grocery budget on meat, poultry, fish and eggs. The American consumer eats on average 222 pounds of red meat and poultry a year, and that number is rising. The USDA predicts that beef and pork production will steadily increase until 2025.

Consumers will likely be eating more chicken as well. The National Chicken Council reports that the American consumer ate 93 pounds of chicken in 2018, up a pound from the year before, and predicts that consumers will be eating close to 95 pounds in 2019.

Shoppers also care now more than ever about whether meat producers are doing the right thing. A 2018 study found that half of respondents did not trust that animals are treated fairly in the meat, egg and dairy industries. Seventy percent of respondents care about labels that indicate how farm animals are treated, and the research showed that consumers are willing to put their money where their mouth is and pay more for ethically sourced meat, eggs and poultry.

But labels on food packaging can make shopping at the grocery store confusing. Does the certified organic label, and the higher sticker price, really mean that the chicken was humanely raised? And what's the difference between cage-free and free-range?

The following guides will help you cut through the meat aisle clutter and interpret common labels so that you can choose poultry, meat and eggs that are fresh, free of unwanted additives and raised using the standards for sustainability and humane treatment that you're looking for. ●

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TO FIGHT THE GLOBAL RISE IN ANTIBIOTIC RESISTANT DISEASES, BUY MEATS RAISED WITHOUT ANTIBIOTICS.

+
TAKE A STEAK OUT OF THE FRIDGE 30 MINUTES BEFORE COOKING, TO ENSURE THAT IT BROWNS BETTER AND COOKS FASTER.

Beef and Pork

Let's get to the meat of the matter: when buying beef, there are many choices to make besides what cut you want. Here are meat-buying and storage musts along with some common labels.

Fresh beef should be bright red. Occasional gray or brownish discoloration caused by oxidization can be unappealing but is safe to eat. Vacuum-packaged beef will be maroon because of the lack of oxygen. Look for pork that is light red to cherry red, never pale or white. The fat should be white and creamy with no dark spots. Avoid pale, soft pork sitting in the package in liquid—it indicates pork that comes from animals stressed during processing. The meat will be dry and tasteless even when cooked to the desired degree of doneness.

The meat should be firm to the touch with little to no excess moisture in the package, and the packaging should be in good condition. Avoid beef and pork that has a bad odor or is sticky or slimy to the touch. Finally, be sure to check the "use by" date.

Refrigerate or freeze meat as soon as possible after purchase. Be sure to cook it or freeze it by the "use by" date on the package. If you're freezing beef or pork for longer than two weeks, make sure it is wrapped tightly, either in a vacuum-sealed package, heavy-duty foil, freezer paper or a freezer bag. Frozen meat should be defrosted in the refrigerator, never at room temperature, to prevent bacterial growth.

Terms to Know

Prime, Choice or Select: The USDA assigns a quality grade to beef, determined by the amount of marbling and the age of the animal, both of which affect the tenderness, juiciness and flavor of the meat. Prime meat has the most marbling (fat) within the meat, making it juicy and flavorful but also increasing its fat content; Select has the least marbling; Choice is in the middle.

Raised Without Antibiotics: This term indicates that the animal wasn't given antibiotics to prevent or treat a disease or to promote growth.

No Hormones: Producers who show documentation that they do not use hormones to promote growth when raising their cattle or pigs may use this label.

Percent Retained Water: To control pathogens like salmonella, producers must quickly lower the temperature of meat during processing. Most do this by immersing the slaughtered animals in a cold bath, which causes them to absorb water. The USDA requires producers to list the maximum amount of water that may be retained.

Certified Organic: This USDA-regulated term means that all feed given to cattle and pigs must be certified organic, which means no synthetic fertilizers, pesticides, animal by-products or other additives. Farmers cannot use antibiotics or growth-promoting hormones on cattle raised to meet certified organic standards. The animals must also have access to pasture.

Certified Humane Raised and Handled: Overseen by a nonprofit endorsed by the American Society for the Prevention of Cruelty to Animals and the Humane Society of the United States, this label ensures the animal received basic standards of care. For example, in conditions of extreme heat, sun shades and water-cooling systems must be available to cattle, and they must have sufficient room to lie down in their normal positions in a clean area. Pigs must have access to straw or other material to root around in, as well as objects for manipulation, such as chains or balls.

Grass-Fed: "Grass-fed" on a label is no longer a USDA-regulated term, but there are third-party groups that certify how cattle are fed. The American Grassfed Association's third-party-certified logo goes beyond by indicating not only that cattle are 100 percent grass-fed, but also that they were raised without hormones or antibiotics, were not confined and were raised humanely. The Food Alliance logo also certifies grass-fed claims.

Grain-Finished, Grass-Finished, Pastured: These terms are unregulated.

Poultry and Eggs

Chicken and eggs are two of the most convenient mealtime heroes, but it all starts with buying the right bird or carton. Here are some grocery store tips, and common labels decoded.

The best way to ensure you're buying the freshest poultry is to look at the fat—it should be white to deep yellow, never gray or pale. Make sure the package is well wrapped and leak-free. Check the label carefully to avoid poultry that has been "enhanced" with an added sodium solution—it's higher in sodium than poultry without added solution. The word "natural" on the label does not guarantee a nonenhanced product. To determine if poultry is enhanced, scan the ingredients on the label for any added solution that is not plain water.

As with beef and pork, refrigerate or freeze poultry as soon as possible after purchase. If you're freezing poultry for longer than two weeks, make sure it is wrapped tightly, either in a vacuum-sealed package, heavy-duty foil, freezer paper or a freezer bag. As with meat, frozen poultry should only be defrosted in the refrigerator, never at room temperature.

Choosing eggs has gotten pretty complicated. First, there's color. While you may find some pretty eggs, especially from small farms or at the farmers' market, there's no inherent nutritional or taste difference. The hen's breed determines the egg color.

Terms to Know

Free-Range: This USDA-regulated term means that birds raised either for eggs or meat are granted access to the outdoors.

Certified Organic: This USDA-regulated term means that all feed must be certified organic: no synthetic fertilizers or pesticides, animal by-products or other additives. Certified organic poultry must also meet free-range criteria.

Raised Without Antibiotics: This term indicates that the birds were raised without antibiotics for health maintenance, disease prevention or treatment of disease.

No Hormones: The USDA prohibits the use of hormones in poultry, so while the label "hormone-free" is accurate, it doesn't set one poultry product apart from another.

Natural: One of the most widely used labels, the term means that no additives or preservatives were introduced after the poultry was processed. "Natural" has nothing to do with standards of care, or type and quality of feed.

Vegetarian-Fed or All-Vegetable Diet: The birds were fed a diet containing no animal products. This is a controversial practice because chickens and turkeys are not naturally vegetarian, and poultry feed usually includes some meat and poultry by-products.

Percent Retained Water: To control pathogens like salmonella, producers must quickly lower the temperature of meat during processing. Most do this by immersing the slaughtered birds in a cold bath, which causes them to absorb water. The USDA requires producers to list the maximum amount of water that may be retained.

Air Chilled: Some producers lower the temperature of meat during processing using an extremely cold blast of air. This process does not result in any retained water.

Certified Humane Raised and Handled: Overseen by the nonprofit group Humane Farm Animal Care, this label ensures the birds received certain basic standards of care and were encouraged to engage in natural behaviors, such as perching, pecking and scratching, and foraging for food in their bedding.

Farm-Raised: This is not a regulated label, so it can technically be used on almost any poultry products.

Pasture-Raised: This is not a regulated label, but Humane Farm Animal Care has created a standard for the term. Birds must be outdoors year-round, with access to housing or shelter where they can go inside to protect themselves from predators or extreme weather.

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JUICY DARK-MEAT CHICKEN LEGS ARE HARD TO OVERCOOK AND ARE GREAT FOR BRAISING, GRILLING AND ROASTING.

Weeknight Favorites

Researchers have linked high dietary intake of lutein—a carotenoid abundant in celery—to reduced risk of many types of cancer.

Caramel-Lime Drumsticks with Shaved Celery Salad

ACTIVE 35 min **TOTAL** 35 min

The sauce that lacquers these drumsticks is a superintense mash-up of sweet and tart. And we promise that's a good thing.

8 chicken drumsticks (about 2½ pounds total)
1 pound celery hearts, trimmed
1 teaspoon lime zest
2 tablespoons lime juice plus ¼ cup, divided
2 tablespoons reduced-sodium tamari
¼ cup light brown sugar

1. Position racks in upper and lower thirds of oven; preheat to 450°F. Set a wire rack on a rimmed baking sheet and coat both with cooking spray.

2. Place chicken on the rack and sprinkle both sides with ¼ teaspoon salt. Roast on the lower rack until an instant-read thermometer inserted into the thickest part without touching bone registers 165°F, 20 to 25 minutes.

3. Meanwhile, use a vegetable peeler to shave as much of the celery as you can into ribbons. Thinly slice any celery that can't be shaved. Toss the celery in a large bowl with 1 tablespoon extra-virgin olive oil, lime zest and 2 tablespoons lime juice. Set aside.

4. Combine the remaining ¼ cup lime juice and tamari in a small bowl; set near the stove. Whisk brown sugar and 1 tablespoon water in a small skillet. Then, without stirring, cook over medium heat until the sugar is bubbling, fragrant and deep amber in color, 3 to 5 minutes. Remove from heat and add the tamari mixture. Return to medium heat and simmer rapidly, stirring occasionally, until thickened, 2 to 4 minutes. Remove from heat and whisk in 2 tablespoons unsalted butter.

5. Preheat broiler to high. Brush the chicken with some of the caramel sauce. Broil on the upper rack until browned in spots, 1 to 2 minutes. Serve the chicken over the reserved celery salad with the remaining caramel sauce drizzled on top.

SERVES 4 2 drumsticks and 1 cup salad each

CAL 440 / **FAT** 24G (SAT 8G) / **CHOL** 203MG / **CARBS** 19G / **TOTAL SUGARS** 15G (ADDED 13G) / **PROTEIN** 36G / **FIBER** 2G / **SODIUM** 759MG / **POTASSIUM** 666MG

Scallops with Radicchio-Apple Slaw

ACTIVE 25 min **TOTAL** 25 min

The secret to getting a nice golden-brown sear on your scallops is to buy ones that are labeled "dry." That means they haven't been treated with sodium tripolyphosphate (STP), a preservative that helps them retain water, which prevents them from browning well.

- **2 tablespoons cider vinegar**
- **1 teaspoon Dijon mustard**
- **2 medium Granny Smith apples, julienned**
- **2 cups thinly sliced radicchio**
- **1 pound dry scallops, muscle removed**

1. Whisk vinegar and mustard with 2 tablespoons extra-virgin olive oil in a large bowl. Season with a pinch of salt and pepper to taste. Add apple and radicchio and toss to coat. Set aside.

2. Thoroughly pat scallops dry, then sprinkle with ¼ teaspoon salt. Heat 2 tablespoons canola oil in a large skillet over high heat. Add the scallops and cook until browned, 2 to 3 minutes per side. Serve with the slaw.

SERVES 4 3 ounces of scallops and 1 cup slaw each

CAL 260 / **FAT** 15G (SAT 2G) / **CHOL** 27MG / **CARBS** 16G / **TOTAL SUGARS** 8G (ADDED 0G) / **PROTEIN** 14G / **FIBER** 3G / **SODIUM** 657MG / **POTASSIUM** 399MG

If you don't have a grilling basket, it's time to change that. You can grill anything in it that might otherwise fall through the grates. Find one at a hardware store or online.

Hibachi Steak Salad

ACTIVE 40 min **TOTAL** 40 min
TO MAKE AHEAD Refrigerate dressing (Step 4) for up to 3 days.
EQUIPMENT Grill basket
Think of this as the Japanese steak house experience in salad form: we turned the dipping sauce for the steak into a dressing and added plenty of vegetables.

- 1–1¼ pounds boneless strip steak (1–1¼ inches thick), trimmed
- ½ teaspoon salt, divided
- ¼ teaspoon ground white pepper
- 2 medium summer squash *and/or* zucchini, cut into 2-inch pieces
- 1 medium onion, sliced
- 1 tablespoon toasted (dark) sesame oil plus 2 teaspoons, divided
- ⅓ cup mayonnaise
- 4 teaspoons rice vinegar
- 2 teaspoons reduced-sodium tamari
- 2 teaspoons ketchup
- 2 teaspoons grated fresh ginger
- 1¼ teaspoons sugar
- ¼ teaspoon garlic powder
- 8 cups chopped romaine lettuce

1. Place a grill basket on one half of a grill; preheat grill to medium-high.
2. Season steak with ¼ teaspoon salt and pepper. Toss summer squash (and/or zucchini) and onion in a large bowl with 1 tablespoon oil and the remaining ¼ teaspoon salt.
3. Transfer the vegetables to the grill basket. Cook, stirring once or twice, until tender and charred, 8 to 10 minutes. Oil the other side of the grill rack and grill the steak, turning once, 3 to 4 minutes per side for medium rare. Let rest on a clean cutting board for 5 minutes.
4. Meanwhile, combine mayonnaise, vinegar, tamari, ketchup, ginger, sugar, garlic powder and the remaining 2 teaspoons oil in a small bowl.
5. Arrange lettuce on a platter. Slice the steak into ½-inch-thick strips. Top the lettuce with the steak and vegetables. Serve with the dressing.

SERVES 4 about 3 cups each
CAL 376 / **FAT** 25G (SAT 5G) / **CHOL** 68MG / **CARBS** 13G / **TOTAL SUGARS** 8G (ADDED 2G) / **PROTEIN** 25G / **FIBER** 3G / **SODIUM** 609MG / **POTASSIUM** 594MG

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Snack Smart

With smart food choices, your bites between meals can work with your body, and not against it.

+

BEWARE OF SNACK PACKAGING MAKING "HEALTHY" CLAIMS THAT MIGHT NOT TELL THE FULL STORY.

POPCORN

We're not talking about movie-theater butter here. Air-popped popcorn, without all the extras, is packed with fiber and is a satisfying go-to snack.

YOGURT

Dairy has been shown to boost hormone levels associated with fullness. Yogurt itself is packed with satiating protein. Watch out for mix-ins with added sugars.

EDAMAME

These vegetable soybeans are loaded with vitamins like folate and vitamin K, and provide all the amino acids the body needs as a protein source.

ALMONDS

Like other nuts, almonds are a great source of heart-healthy fat. High levels of vitamin E and plant-based calcium make these nuts a standout snack.

The Pleasure of Healthy Eating

Finding ways to better your health doesn't need to be overly complicated or rigid. A few simple (and delicious) principles can help you live a longer and healthier life.